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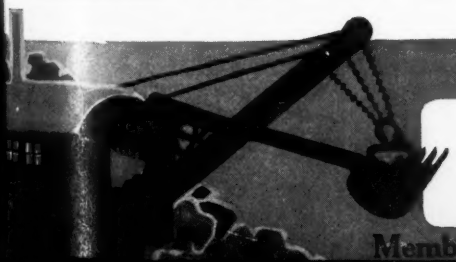

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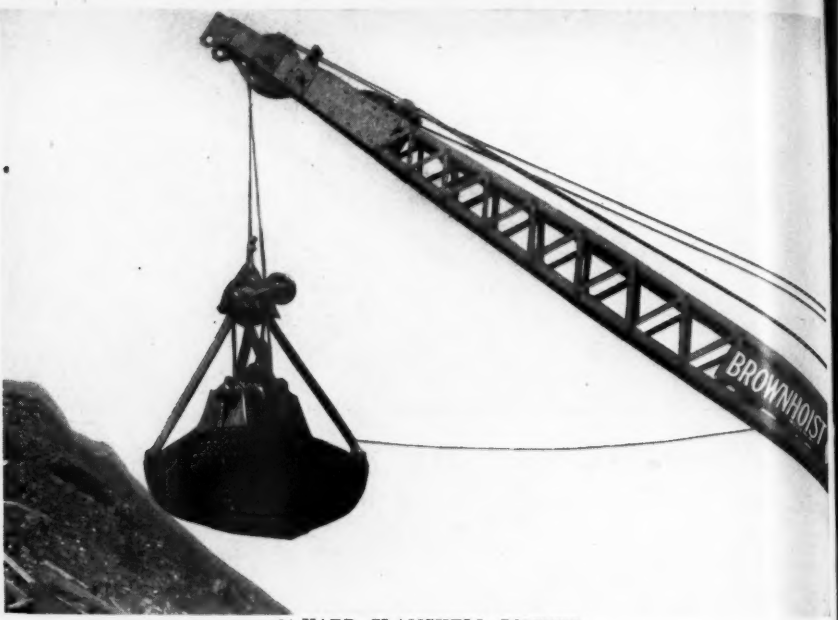

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Member Audit Bureau of Circulations
A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 6 CHICAGO, ILL. MARCH, 1922 NO. 6

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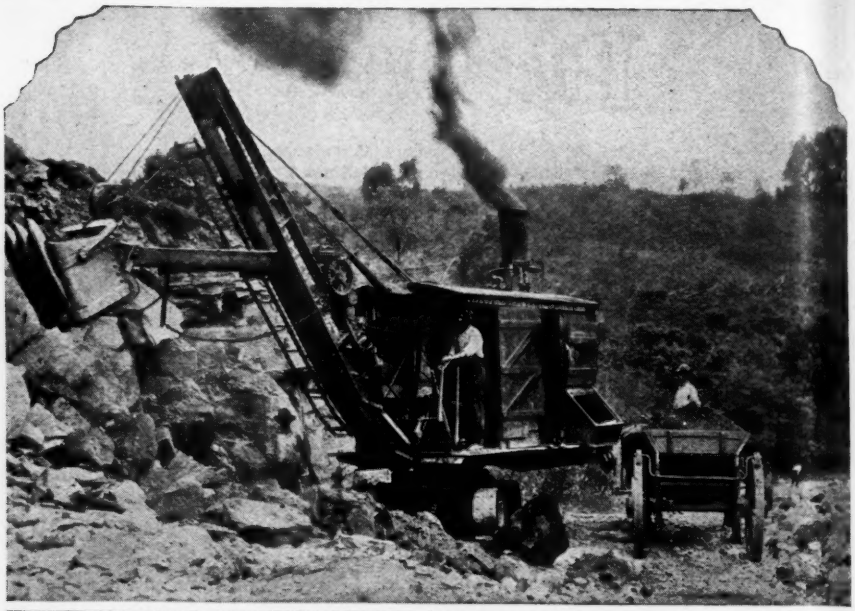

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Pit and Quarry

Vol. 6 Chicago, Ill., March, 1922 No. 6

Sand and Gravel Men at New Orleans

THE people were glad they went to New Orleans—there was no doubt about that. And if they did not expect to mix a little pleasure with their convention business, why should they have chosen to go to such a city, anyway?

Why, indeed?

They knew from experience that at Chicago they could have a real honest-to-goodness convention, full of uplift and good-of-the-order. But they deliberately chose the balmy air of the Gulf country, the lure of the unusual in racial characteristics, the desire to see such antiquity as our nation can boast. And in the end some of them hoped to have money enough left to carry them over to Cuba.

But so far as the convention was concerned, these sand and gravel men would be there, to be sure; far be it from them to waste time and money in mere frivolity and sight-seeing. But you remember how it was back in the school days, when spring burst upon you and the fish began to bite, and the whole out-of-doors presented an attraction too great to resist.

So if there is any producer who has not been able to go back to his board of directors and present a coherent account of the doings of the National Association of Sand and Gravel Producers at New Orleans, we bespeak for him a kindly indulgence. He at least got together with his fellow producers in informal fashion, and no doubt accomplished just as much good as though the days had been crowded with intensive discussion of the problems of production and distribution.

So, you directors, we hope you have listened indulgently to the recital of strange tales about the Latin quarter, and the harbor trip, and the French table d'hote, and the markets and palm trees and roses growing in the parks in February. We are here to tell you that for the most part the fellows behaved themselves—even the few inconsiderate ones who left their wives at home.

But the sum total of convention activity was not inconsiderable, after all, when the strands are gathered together; and while personality always counts strong at such a time, this convention story can, better than many others, be told under a series of personal headings. And the first of these is

Alec W. Dann

This being the time for the biennial election of a president, the nominating committee had the full approval of the convention in placing before it this prominent Pittsburgh operator, and he was elected without opposition. He is a man who has been of late looming larger and larger in the councils of the sand and gravel industry, especially in connection with its fight for greater justice in the matter of freight rates. We do not know Mr. Dann's politics, and he may resent any likening of himself to Mr. Bryan; but they are at least alike in this, that a speech won each a nomination. For it is pretty certain that Mr. Dann's statement before the Interstate Commission marked him un-

mistakably as presidential timber. His was no impassioned oratory about a "cross of gold," however,. but a straightforward statement of fact such as would have won immediate action from any business man not hampered by red tape and the intricacies of governmental machinery. Neither is Mr. Dann the kind of man to be a perennial candidate for any office. His qualities are of the constructive rather than the agitator type; he assumes this presidency with such modesty and diffidence that he does not even care to have his portrait published in connection with this report, but having set his hand to the wheel no one doubts that he will steer a safe and straight course to such port as he determines that the organization should reach. Mr. Dann especially expressed his extreme humility in following such a president as

V. O. Johnston

It has been extremely fortunate for the association that Mr. Johnston, during his two years in the presidency, has been able to devote himself almost unreservedly to the work of the office. He has traveled the country over, building up state and group organizations, assisting in local causes, adding new members to the National, ready to act at any time and place for the good of the industry. Mr. Johnston goes out of office with no enemies and a host of friends, and could get a practically unanimous vote for almost anything he might want. While we should perhaps "stick to our knitting," and suppress our own personal opinions, we cannot help saying to the executive committee that Mr. Johnston would be our choice if he could be persuaded to accept the place, as a successor to

E. Guy Sutton

whose resignation as executive secretary was announced on the first day of the convention. This was bad news indeed; for Mr. Sutton has made a loyal, diplomatic, and clear-sighted secretary, and his worth in the eyes of his fellows was attested by the presentation of a handsome gold watch and the passage of the following resolutions:

Whereas, E. Guy Sutton, who, for the entire period of its existence, has been Executive Secretary of this Association, is now leaving us to reenter the sand and gravel business, and,

Whereas, It is the desire of our membership to record our appreciation of the service he has rendered, now, therefore, be it

Resolved, That this Association hereby expresses its sincere regret at the ending of a long and harmonious relation; that it acknowledges its indebtedness for highly efficient representation before various public bodies; for valuable contacts made; for the promotion of harmony between its members; for tactful persistence in the face of serious obstacles; for wise counsels, and for increased recognition and respect for our industry.

That this Association extend Mr. Sutton its best wishes for success in the field of his future activities and assure him of the cordial cooperation of our members, and that a copy of this resolution be entered on the official minutes of this organization.

Mr. Sutton's report was, as usual, one of the important documents of the session. Its reading shortly after the opening of the convention was interrupted by the appearance of Mayor Andrew J. McShane of New Orleans, who extended a belated but nevertheless hearty welcome to a city where everyone felt at home the moment he arrived.

Mr. Sutton devoted much of his report to a history of freight rate activities, saying that the effort of the association during the year had been devoted mainly toward the removal of the inordinate rate increases which have been placed against sand, gravel and stone. This part of the work is perhaps better known than any other, so that we can go on at once to other

phases of the report, quoting liberally:

During the year 1921 only a few complaints came to our headquarters of instances where railroads had refused to supply empties and in each case we lodged protests with the Car Service Division. Upon investigation it was found that the railroads had acted without authority in denying cars to producers and the situation was speedily remedied. However, sand, gravel and stone producers will not soon forget the experiences of 1920 when, as a result of priorities, our industry was so severely crippled. If all unfavorable aspects of our business were adjusted to our complete satisfaction and a fair supply of cars were withheld, the industry would become demoralized and soon cease to function altogether. We must, therefore, be prepared at all times to see that our rights for a fair distribution of cars are respected.

On April 13, 1921, Senator Calder introduced in the Senate a bill which followed the lines of our recommendations, the bill in question being identified as Senate Bill 690. Owing to the fact that the Senate Committee on Interstate Commerce has been conducting a general investigation into the railroad situation it was not found practicable to press this bill for consideration during 1921. However, I have submitted to the committee a brief reciting the reasons which actuate us in urging an amendment to the Transportation Act resigning the Interstate Commerce Commission from arbitrarily, and without a moment's notice, issuing car service orders, which can have but one effect, that of disturbing all industry and destroying business in general. It is our purpose to press for early and favorable action on this bill in order that our industry may be relieved from the contingency of a sudden denial of transportation facilities.

While no definite action has as yet been had on the bill, still its introduction has had a most salutary effect upon the previous attitude of the Commission and the railroads toward our industry. In this way, we have served notice that the sand, gravel and stone industry, organized into an active association, is determined to see that it will not be treated unfairly in the issuance of government and official regulations. We assert that in the case of a common and national misfortune, we stand ready to abide by all reasonable and equitable orders; but we likewise maintain that in the event of a shortage of transportation equipment, all industries should share alike in the shortage and no one should be completely cut off from its right to move its products while other industries enjoy the right of way over the railroads.

We believe that the Association has served the industry in no better way than in the progress which has been made toward curing the evil situation which existed with regard to car supply.

Before leaving the subject, it may be well to discuss briefly the possible situation with respect to car supply for next year:

As a result of exploitation, bad management, labor difficulties and inconsistencies, too much regulation and experimentation, for all of which the railway officials, the public and the Government are in varying degrees responsible, the railroads today are in a bad fix. They have not kept apace with the industrial development of the country. If the business of the country should suddenly or even gradually return to its so-called normal magnitude, the railroad facilities, including main-line tracks, terminals and rolling stock, would be wholly inadequate.

The railroad labor situation is not settled; the coal miners and the operators' agreements expire in April with every likelihood of a drawn-out contest being staged over the check-off system in addition to the question of wage reductions and the "open shop" and with the probability of a scant fuel supply on hand. The poor condition of railroad equipment in general is a matter of common knowledge and concern. The number of serviceable cars, according to last available reports, was only 85 per cent of the total cars owned by the railroads and the policy being followed by most of the carriers is to defer repairing their equipment as long as business is dull.

Elisha Lee, Vice-President, Eastern Region, Pennsylvania Railroad, in addressing the Association of Manufacturers' Representatives recently, made the following statement:

"The next time our country has a real revival of business we shall in all

Continued on page 82

Gravel from River Bar

Cairo Sand and Gravel Co. Begins Operations on Mississippi

A MODERN gravel plant of good capacity which promises to be very successful, is that of the Cairo Sand and Gravel Company, Cairo, Illinois. This concern takes sand and gravel from a bar on the Mississippi River. This bar together with other ground which also produces gravel, has an area of about 300 acres. The deposit analyzes 30 per cent gravel and 70 per cent sand, with a comparatively small amount of foreign substances.

The gravel will be taken out by a Link-Belt cableway, operating a one yard bucket over a 700 foot span. The line is anchored in the river by a 40-ton deadman. It is sunk deeply and sure to hold against any strain that is likely to be put upon it. The deadmen for the mast guys are sunk 10 feet and are made of 2x3x10 railroad irons in concrete.

Mr. A. S. Fraser, superintendent of the Cairo Sand and Gravel Company, does not expect to find it necessary to move the cableway deadman from time to time, but thinks that he will be able to take out all the gravel necessary by simply making a long cut between the deadman and the plant, and depending upon the movement of the river to bring down to this cut all the gravel that will be required to work the plant to capacity.

The cableway mast shown in the photograph was built by Mr. A. L. Sanderson, vice-president of the company, and was erected by Mr. Fraser. This mast is built upon a concrete foundation, as are both the hoist house and the washing plant. The mast was built in sections and erected part by part, until the whole was in place. The mast reaches 104 feet above ground and 150 feet above the bar on the river from which the gravel is being taken.

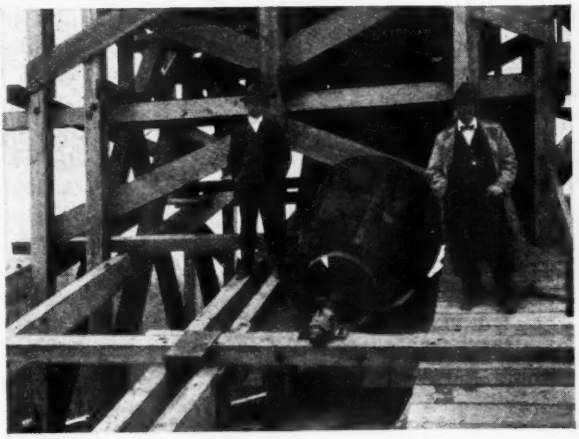
An interesting observation that emphasizes the great expense of putting up a gravel washing plant is that of Mr. Fraser, who remarked, in going through the plant, that "the bolts alone used in putting up the washing plant and the mast cost $1,000."

The cableway system is operated by a Thomas hoist, driven by a 75 h.p. Wagner motor. It takes one minute and 10 seconds for this hoist to bring the bucket through one complete cycle. The drums of the hoist are equipped with niggerheads for moving cars on the loading track, should the gravity drop method of bringing the cars to the spouts be unsatisfactory. Three-eighth inch Roebling cable is used in the cableway system.

Looking Down at Automatic Settling Tank

The plant is equipped with a Dull rotary

screen which makes a separation of less than ¼-inch, ¼ to ¾-inch, and ¾ to 2 inches. There is not enough oversize material to make the installation of a crusher necessary. No grizzly is provided for taking out large stones before entering into the screen.

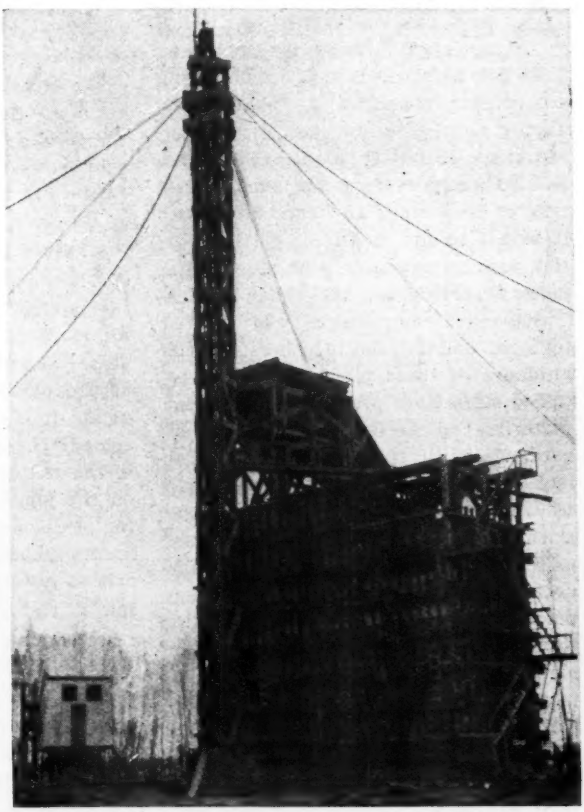


Mr. Sanderson at the left, Mr. Fraser at the right

The washing feature of the plant is taken care of by a centrifugal pump with a 4-inch intake and a 6-inch discharge, manufactured by the Advance Pump and Compressor Co., of Battle Creek, Mich. This pump is operated by a 20 h.p. motor and pumps water at the rate of about 400 gallons per minute which would mean, with the cableway working at capacity, about 400 gallons of water to each yard of material, making very thorough washing possible.

All the equipment around the plant is electrically operated by central station power, a line being run from the traction company's power line, about half a mile away. Alternating current is supplied at 220 volts, 60 cycles.

After the gravel has gone through the screens it goes on to the bins, which have a 10-car capacity. There are two gravel bins, and one sand bin. The last is supplied from the automatic sand separator devised by the Link Belt Company.



General View of Plant of Cairo Sand & Gravel Co.

There is a tail track with a capacity of ten cars, slightly inclined, so that the cars will drop down by gravity to the spouts of the bins. As the plant is not located in a place easily accessible to auto trucks, provision has not been made at the present time for the loading of trucks, although this business can later be accommodated by making some very slight changes in the plant.

A 4,000 foot track has been built from the Iron Mountain and Southern Railroad, to the plant. This has not as yet been ballasted, and the company hopes to use some of the first material it produces for this purpose.

Inspectors at Plants

A TOPIC that gravel and stone men can well afford to discuss at considerable length when they get together is that of installing competent inspectors at plants producing aggregates for use in the construction of public roads. They can adduce many reasons for such a system of inspection and can show that it would be the means of getting justice for the producer and more satisfactory service for the road builder.

Suggested by this is the related topic of definite specifications for the guidance of these plant inspectors.

Too often have producers turned out materials in good faith and in accordance with instructions and later had these materials rejected on the job by inexperienced or opinionated inspectors whose dictum had to be taken as final and whose power of arbitrary decision in many cases seriously hampered operations. In many cases the producer has seen one inspector commend and another condemn two lots of material produced under identical conditions and, as far as could be determined, alike in all respects. All of which shows the necessity for experience on the part of the inspector and the need of rules to prevent him from substituting his own opinions for those of the men who have the work in charge.

That would be nothing more or less than simple justice. When the state, directly or through a contractor, orders material of a certain quality and when that material is produced, to the best of his knowledge, by a plant owner, he should be protected from the danger of having the material thrown out by a man who does not know that he has received first-class stuff and from the needless railroad costs that such a system entails.

If there must be inspectors, let us have experienced ones. Let us have them located at the plants, where they can do their work more effectively and where the producer will be, to some extent at least, protected from the results of erroneous judgments.

We believe that the expense to the state of maintaining such an inspection system would be comparatively very small—not over 2 or 3 cents a yard—and more than justified, because of the way in which it would expedite the building of roads.

When material is rejected on the job the paving contractor is likely to be hit as well as the producer of aggregates. When a lot of material is found at the plant to fall short of requirements it is a much simpler matter to remedy the condition than it would be if the material was already delivered on the job. No money has been spent for railroad hauling, the producer knows about the matter sooner, and can at an earlier date set about making it right. The cars in which the rejected material would have been shipped are already at his plant and can be used for sending out the approved aggregates. Everything considered, the plan seems to have so much to commend it that action urging its general adoption might well be considered.

Ideas on Quarry Blasting

Extracts from a paper presented before the National Crushed Stone Association

By N. S. GREENSFELDER
of the Hercules Powder Co., Wilmington, Del.

All the more usual forms of combustion are produced through a combination of inflammable matter with the oxygen in the air. If the mixture is sufficiently complete, large volumes of gases may be formed in a short space of time, or in other words, an explosion occurs. These gases are expanded by the heat on combustion and exert an enormous pressure which accomplishes useful work when they are confined. By mixing certain substances that contain oxygen with the proper combustibles, explosives are produced.

Gunpowder consists of finely pulverized saltpetre, charcoal and sulphur. Black blasting powder contains similar ingredients, the difference being that a coarser grade of charcoal is employed. Both gunpowder and blasting powder are called low explosives.

When cotton is treated with nitric acid, the result in guncotton or nitrocellulose, the principal ingredient in smokeless powder, and an important ingredient in gelatin dynamite. Glycerin properly treated with nitric and sulphuric acid produces nitroglycerin, an important component of many high explosives.

At the present time both low and high explosives are used in quarrying, viz., black blasting powder and dynamite.

When black blasting powder, which is a low explosive, is ignited, the combustion is transmitted from one grain of powder to the next and so on throughout the entire charge. The ignition is accomplished by the flame from a fuse or some other agent. By varying the size of the grains, different velocities of burning are obtained. The finer the granulation, the quicker the action of the powder.

Dynamite and other high explosives are exploded by a shock or blow such as produced by a blasting cap or Cordeau-Bickford detonating fuse. The violent result is called detonation to distinguish it from the slower "deflagration" or low explosives.

Black blasting powder produces more of a heaving than a shattering effect. Its force is apt to spread over a greater area and its shattering effect on the material broken is relatively small. Dynamite, because of its faster rate of detonation, which generally increases with the higher strengths, has a greater shattering effect and is more local in its action than black powder. In the denser, harder formations, and in cases where finely broken stone is desired, dynamite possesses decided advantages over black powder. It is more convenient to handle, more water resisting and not so sensitive to sparks and heat. Dynamite was invented in 1866, by Alfred Nobel, a Swedish engineer. It has been invaluable during the period of great industrial development of the last half-century.

The effectiveness of any explosive is largely dependent upon the proper placement of bore holes in which its work is performed. The subject of drilling, therefore, is one of great importance to all quarrymen. Drilling and blasting are so interdependent that a consideration of one would be incomplete without a study of the other. In fact, one cannot make a proper plan for placement of drill holes without first considering the grade and strength of explosive which the bore holes are designed to receive.

Where there are numerous open joints in a rock ledge, the problem of drilling becomes complicated. Fissures in the rock tend to slow down the speed of drilling as well as making it more difficult. Furthermore, an open seam provides an avenue of escape for the gases from the detonated explosive charge, thus reducing the effectiveness of the shot. It is usually advisable to abandon a hole cutting such seams or cavities. The cost of drilling in unsound rock is thereby increased.

If these joints are irregular and change in direction abruptly many useless holes may be drilled unless systematic measurements of the joints are made with compass and clinometer and they are carefully plotted on paper. Undoubtedly a chart of all

the joints containing all the information possible to obtain from careful measurements is of great assistance in locating drill holes and avoiding the drilling of useless holes.

Blasting at quarries may be considered under two distinct heads, viz., primary blasting and secondary blasting.

Primary blasting refers to all shots made in the quarry ledge in its original position, for the purpose of breaking down portions of the ledge into fragments of different sizes.

Secondary blasting is that which is necessary to break up the larger rocks obtained from the primary blast, into sizes small enough for subsequent handling for loading or crushing.

No problem which the quarryman encounters in his operation is more complex and requires a greater amount of careful study in order to obtain satisfactory results than does primary blasting. This is due to the many varying conditions encountered in different sections, in different formations at the same quarry and at times irregularities and sudden changes in an individual formation at different points in the same quarry.

The chief variable factors affecting primary blasting are listed by the U. S. Bureau of Mines (Bulletin 160) as follows: (1) Height of face. (2) Hardness and uniformity of rock. (3) Altitude of beds. (4) Prevalence of open bedding seams and joints. (5) Altitude of quarry floor. (6) Size and depth of drill holes. (7) Arrangement and spacing of drill holes. (8) Number of holes shot at one time. (9) Size of charge. (10) Position of charges in drill holes. (11) Type of explosive used. (12) Method of firing shots. (13) Method of loading rock. (14) Size of crusher.

The practice of shooting down large tonnages of rock at a single blast is continually growing in favor at cement and limestone quarries. Quarry faces vary in height but 150 feet may be considered the upper limit for safety. The throwing down of large masses of rock in a single shot creates conditions favorable to the use of the steam shovel for loading.

Nitroglycerin dynamite is the standard by which all high explosives are measured on weight for weight bases, therefore it should contain the actual amount of liquid nitroglycerin designated by its percentage strength. Its high rate of detonation make it a good explosive to use where a strong shattering effect is desired. It resists water well, a valuable asset where wet holes are encountered.

Extra or ammonia dynamite has the same strength, grade for grade, as straight nitroglycerin dynamite. Its rate of detonation is not quite so high. Nevertheless, it is a quick explosive. Its explosive base consists of nitroglycerin and ammonium nitrate. The latter will not resist water very long, but the cartridges of extra dynamite are dripped a second time in paraffin after they have been filled so they will withstand the action of water for a considerable time if they are not split in loading. Extra dynamite is not as sensitive to friction or sparks as is straight dynamite.

When a small amount of nitrocotton is dissolved in nitroglycerin, it forms a jelly-like substance which is a stronger explosive than pure nitroglycerin. When various absorbent materials are added, the result is a plastic explosive denser than ordinary dynamite. Because of this density, a given weight of gelatin can be confined in a smaller space than would be required to contain an equal weight of straight nitroglycerin or extra dynamite. This quality makes gelatin a decidedly advantageous explosive to use in hard, tight formations where a concentrated charge at the bottom of the bore hole is desired.

Gelatin has a lower rate of detonation, and hence is less shattering in its effect, than straight nitroglycerin dynamite. However, when fired with Cordeau, its quickness is greatly increased.

Gelatin is extremely water resisting, and is the best explosive to use when the explosive remains under water for a considerable time during loading operations. It is also unexcelled for underground work, because of its plasticity, density, imperviousness to water, and good fumes.

The introduction of electric blasting caps and Cordeau detonating fuse were important contributions to the advancement of quarry blasting. A great increase in efficiency is obtained by firing a number of holes simultaneously over early methods of firing them at intervals.

Electric blasting caps furnished the first effective method of simultaneous firing. By placing one or more of these caps in each hole, and connect-

ing them all to a power circuit or blasting machine, large numbers of holes may be effectively fired. When this system is employed and there is a high column of explosive in the hole, as in well-drilled holes, it is advisable to place several electric caps at intervals in the charge to prevent the wave of detonation in the explosive from decreasing in velocity as it travels along the charge.

The straight parallel connection is the best for electrical blasting if there is sufficient current and voltage to put the current through the circuit. The reason for this is that some caps are more sensitive than others and in anything but a parallel connection, the more sensitive ones may fire first and break the circuit. In the straight parallel connection, each cap is independent and should fire regardless of the other caps. The parallel connection cannot be used with a blasting machine because of the high current required. When the firing is done from a power circuit with sufficient current, the parallel connection is the best.

The next best connection, and one which is good when sufficient current and voltage for the straight parallel connection is not available, is to have the caps connected in groups, and have the caps in parallel and the groups themselves in series. The number of caps and groups is dependent on the available current and voltage. The greater the number of series and the fewer the caps per series, the closer it approaches the straight parallel connection.

However, when a blasting machine is used to fire the blast, the straight series connection should be used because there is not enough current developed to fire a large number of holes connected in any of the other methods described.

The calculations for voltage and amperage required on the various connections described is rather complicated. The explosives manufacturer can assist the quarry operator in selecting the most effective method possible under the existing conditions.

A more recently developed means of detonation is with Cordeau. This consists of a carefully drawn lead tube filled with trinitrotoluene. The three principal advantages claimed for Cordeau are: Safety, instantaneous detonation, increased efficiency from the explosive charge.

Cordeau is so insensitive that it cannot be set off by friction, fire, or any ordinary shock, but requires for detonation an extremely violent shock, such as that produced by a blasting cap.

The average rate of detonation of Cordeau is about 17,500 feet per second. Therefore, when it is placed along an explosive charge, the entire column is detonated at a rate equal to that of the Cordeau. The increase of the rate of detonation that is thus obtained, particularly with the slower dynamites, increases their shattering effect and consequently decreases the cost of secondary blasting.

When loading a deep hole with Cordeau, run an iron bar through the hole in the center of the spool on which it is wound. Lace the end of the Cordeau thru a dynamite cartridge, which acts as a weight in lowering the Cordeau down to the bottom of the hole. When the dynamite cartridge reaches the bottom of the hole, draw the Cordeau taut, so that it will lie along the side of the hole and not interfere with further loading. The explosive charge can be broken as many times as desired because the Cordeau will detonate throughout the entire length of the hole. The Cordeau is then cut off a short distance above the top of the hole, and the end weighted down by a loose stone to hold it taut during the loading.

When all the holes are loaded and the surface cleared for the shot, the main line of Cordeau is unreeled across the tops of the holes and the Cordeau in each hole is connected to the main line. This is done by slitting the piece of Cordeau which extends from the hole, and twisting the ends tightly around the main line. When all the holes are connected to the main line, a blasting cap or electric blasting cap is connected to the end of the main line. The firing of this cap detonates the entire blast.

Always arrange the main line of the Cordeau so that the detonating wave reaches the row of holes next to the face of the quarry first and then the other rows in the order they recede from the face.

It is well, whenever possible, to make a complete circuit of the main line so that every row of holes will have two ways by which the detonating wave can reach it.

Breaking Boulders With Gads

WHEN steam shovels are used to load broken rock into cars or trucks in quarries, but little boulder breaking has to be done; but when cars are loaded by hand, boulder breaking must still be done with sledges. This is also true when rough building stone is produced for rubble masonry.

Many boulders can be broken up with a few strokes of a stone sledge, yet at times rock is so hard that it is difficult to break even small or fair sized boulders with the sledges alone. There are very large boulders that connot be broken with sledges, even if they are large enough for men to stand upon them wielding their hammers.

As a result, explosives are used extensively in quarries to break up boulders. This means a high expense for powder, most of this kind of breaking is done with adobe shots.

One means of breaking hard rock and large boulders with sledges is by using gads.

A gad is a short piece of tool steel, generally 1⅛ inch octagonal steel, from 6 to 18 inches long. Two kinds of points are used, a round blunt point and a chisel shaped point. These are illustrated in Fig. 1. In most cases the chisel pointed gads are used, the round pointed being employed only on very coarse grained rock with little rift to it, such as many kinds of trap rock.

The chisel point is used for rocks with a decided rift to it. The gads can be held in place by hand, yet it is better to make a holder of stiff wire, and for heavy, large gads the wire handle is reinforced by using a piece of round iron about 1 inch in diameter. A loop is made in the wire to let the gad go through it and the wire is wrapped around the piece of iron, which should be about 18 inches long.

The gad can be slipped out of the wire loop and sharpened when necessary. Thus one man holds the gad while another man strikes it, though in many cases the hammer man holds the gad himself. The operation is to hit the rock a few blows with the hammer, thus making an indentation for the gad. The sledger then holds the short gad with one hand, hitting it with the sledge in the other hand. In many cases a few light blows suffice to make the gad stick in place. Then with both hands the sledge is wielded and a few blows of the hammer is generally sufficient to break the boulder.

Even with the long gad and a man holding it, the tool must first be stuck into the rock by light blows, before heavy blows can be struck with the sledge. To strike hard blows at the start will cause the gad to fly off the rock and there is great danger of the tool hitting some nearby laborer and injuring him. In case the gad will not stick in the rock it is advisable to throw a little water on the rock at the point of the gad and this will be found a help. The water is not dashed upon the rock but poured on slowly. For this purpose a bucket of water and a tin can

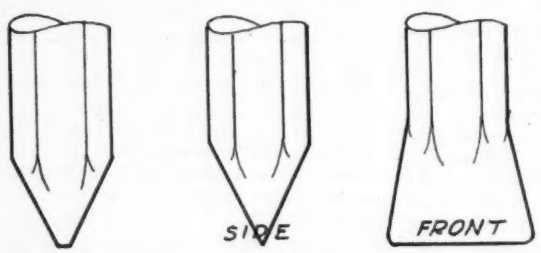


FIG 1 SHOWING POINTS ON GADS

can be kept handy. The writer knows no reason why this water should be a help, but long experience has taught that it is a decided assistance in making a gad stick.

Men soon become expert in handling gads with sledges and can split up rock into slabs that are then easily broken by sledges. There should always be on hand several sizes of gads—both as to size of bits and length. It is necessary to keep the points in good shape at the blacksmith shop. With a good supply on hand men change from one to the other and thus use the tools best suited to their immediate needs.

It is the driving of the steel gad into the boulder that breaks it, just as a log can be split with a wedge. Whenever a stone has a rift in it, the gad should be driven with the rift, just as a man uses a sledge with the rift of the rock. A small gad is often needed to start the breaking, to be followed with a larger one for large sized boulders.

Using a T-Bar for Fire Boxes

WITH flat grates and with many types of patented shaker grates under high power boilers, it is necessary to continually use a slice bar in order to keep the grates clean of ashes and clinkers and break up the fire so that enough heat is produced to keep up the steam pressure on the boiler. As this must be done several times in an hour, and from time to time during the day, the fire doors must be opened a number of times. If each operaton is fairly long, a great deal of the heat generated from the coal is lost, while either the crown sheet or the tubes of the boiler are continually cooled by the action of the air through the fire door.

It is obvious that if the time that the door is open is shortened and if the door is opened less, that much fuel would be saved and the boiler would steam better and quicker. Thus anything that will help this should be considered and used.

The ordinary slice bar is illustrated in Fig. 1. It is evident that if there are many clinkers on a grate of fair size that although a man might spend five minutes with such a bar he is

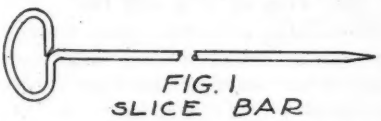


FIG. 1
SLICE BAR

likely to leave many of the clinkers untouched. It is also difficult to clean clinkers from the bricks of the side walls of a fire box with a slice bar, and its sharp point frequently injures the fire bricks.

In Fig. 2 is shown what is known as a T bar, used for slicing instead of the ordinary slice bar. By its use the entire grate area can be gone over much quicker for its long arm will cover one or two of the plain grate bars at a time. This means it will cut the clinkers and clean the grates at the same time. The walls can also be cleaned much easier and with less danger of injuring them.

The T bar can also be used as an evener to break up or smooth over

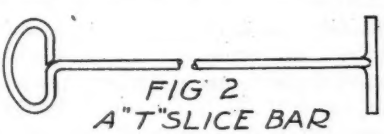


FIG 2
A "T" SLICE BAR

the surface of the fire bed. In fact there are a number of different uses for a T bar in attending to the fire of a boiler.

However a T bar is not so well adapted as the ordinary slice bar to run it under the fire on the grates and break the fire through to the top.

Naturally with shaker grates the fire does not have to be sliced as much as with flat grates and with some patented grates the work of the slice bar is nominally eliminated.

Train Men to Work

NOW that there are many men unemployed, it is becoming possible to get more output out of those being worked. The fact is that laborers and in many cases mechanics are from 80 to 100 per cent as effiicient as they were in 1914 and 1915.

This makes it possible once more to direct men, and even train them to do their work more efficiently. There are some lessons that were learned during the war period that should be remembered.

Men should never be watched every minute; it is very irksome to them. No man wants to have some one with his eyes riveted on him continually. Put yourself in the man's place. Confidence begets confidence and if a man is shown that he is trusted to some extent, in most cases he will respond by doing honest work. This does not mean that there must not be supervision, for there must be; but it should be intelligent supervision, for it has been proven that men to work intelligently must be handled in an intelligent manner. The days of driving and grinding men went out a decade or two ago.

Another lesson we have learned is that men must be treated as human beings and considered both during their working hours and when they are idle. This is really a business investment that pays good dividends. Men must be housed well and under sanitary conditions to keep them fit, and they must be furnished with good water and food if they are to be asked to put forth their best efforts. A man well cared for can and will work; he respects himself and will respond when asked to put forth a special effort. Poorly fed and cared for men will only do indifferent work.

If men are to be asked to put forth their best efforts while working, there must be reasonable hours for work. A man doing physical work is like a horse. After going to a certain limit he will drag, and if spurred on he may respond momentarily but must soon go back to his old pace. A man must have some hours to relax; he feels independent by having this time and he comes back to his work freshened and more interested in it.

The doing away with strong drink, although opposed by most working men, has been to their great advantage as a class. Drinking of intoxicants has not ceased, but there is less of it done, and due to the high prices asked and the fact that the laboring classes are earning less money, it is not possible for them to obtain even substitute drinks as easily as they could get liquor over a bar. Thus less of these men are using excessive amounts of liquors so that they are physically better.

Although there will be many abuses of the change to temperance, yet the general conditions will gradually improve and those reaping a great personal benefit from the eighteenth amendment will be the laboring classes. Indirectly their employers will also be benefited.

One of the easiest ways of directing men is to teach them how to work. To do this some tact must be shown, for if a gang of men are interfered with and made suspicious they can readily be made dissatisfied. Men must first be shown that it is to their own advantage to know how to handle tools and their bodies. This can read ily be done. Take a man using a shovel or a pick. If he works at a stiff pace all day and at the close feels tired, yet has only accomplished a small amount of work, this man is not well off nor is his employer.

If it is possible to show such a man that he can put forth less physical effort, do his work much easier, yet accomplish more, he is not likely to object to being taught, but will in most cases welcome it. Too many

men in using shovels do nearly all their work with their arms, making it a hard, gruelling job. The proper way is to use arms, legs and back and the task becomes much easier and a man can work several minutes without "spelling" himself when another man, using his arms only, can work but one minute.

As it is with the shovel, so it is with nearly all hand tools. Men can be taught to do more work by showing them how to use their bodies and tools, just as a man operating a power drill or a channeling machine will do more work with them after learning how to handle them.

Price Reduction

The Hercules Powder Co. announces a reduction of $7.50 per 1,000 feet in the list price of Cordeau Bickford detonating fuse, effective February 1. This applies to the No. 6 plain, No. 6 countered, and No. 6 double countered grades.

There is also a reduction in price of Cordeau crimpers and straight unions for connecting ordinary Cordeau Bickford.

The Imperial Stone Company, at Bedford, has filed papers showing an increase in its capital stock from $150,000 to $200,000.

Catalog On Type K Engines

The Anderson Foundry & Machine Company, of Anderson, Indiana, are giving to the trade in their new Bulletin No. 23 a treatise on oil engines which will prove interesting to pit and quarry operators. The book begins with a description in a very general way, of the principal Anderson features, and then takes up, under the heading of "Main Points for Consideration," the particular features of the Type K engine, one by one. In all there are thirty-two sections, each devoted to some particular part of the engine. The text is very carefully written, and well illustrated with photograph and line drawings.

One of the principal features of the Anderson Type K engine is the fact that it is equipped with two fly wheels, which are symmetrically designed and correctly proportioned to insure steady operation.

Copies of Bulletin No. 23 may be had by writing the Anderson Foundry and Machine Company, at Anderson, Indiana.

Mr. W. J. Malatesta has recently been selected as the head of the building material department of the Consumers Company in Chicago. Mr. Malatesta is a vice president of the company and has proven his worth by a long previous connection as head of the ice department. Mr. E. J. Endres is the new assistant to the vice president in the building material department and Mr. J. P. Coyle is the new manager of sales.

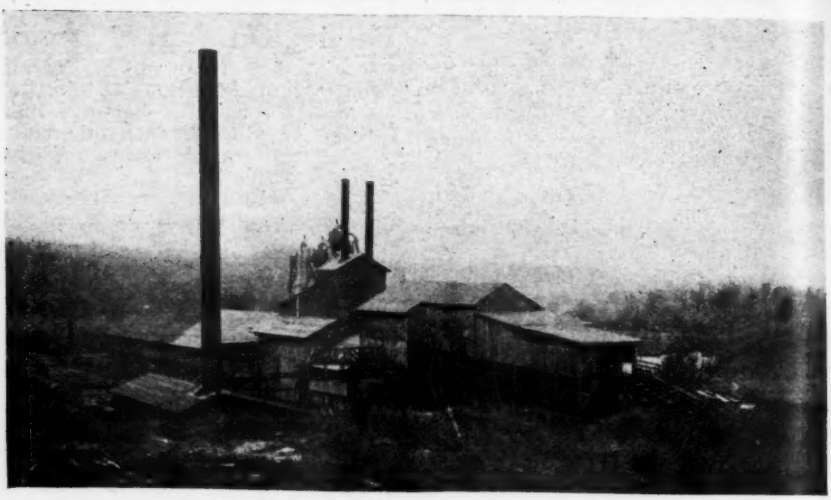
H. D. CONKEY.

"Always Read Carefully" Says Conkey

"PIT and QUARRY is always read very carefully in our office, not only by the writer but by the entire organization," says H. D. Conkey, former president of the Illinois Association of Sand and Gravel Producers, of Mendota, Ill.

"Copies of the magazine are retained for reference and it is one of the sources of information on matters pertaining to our business which we would find it very hard to do without.

"I sincerely trust that your publication will continue to enjoy increased prosperity as the years pass."



General View of Tennessee Agricultural Chemical Corporation Plant.

Big Tennessee Phosphate Plant

THE phosphate rock plant of the Tennessee Agricultural Chemical Corporation, located at Centerville, Tennessee, is one of the largest enterprises in that section of the country and one that is capable of big production of crude and ground rock.

The workings include a 1,500 acre tract of land on Swan Creek in Hickson County about one mile and a half from where it empties into Duck River. On this tract are located about two miles of railroad track, the mining equipment, plant, storage buildings, office, commissary, and chemical laboratory, together with blacksmith shop, pump house and stables. There are also dwellings for the white and colored employees, located close by the plant itself.

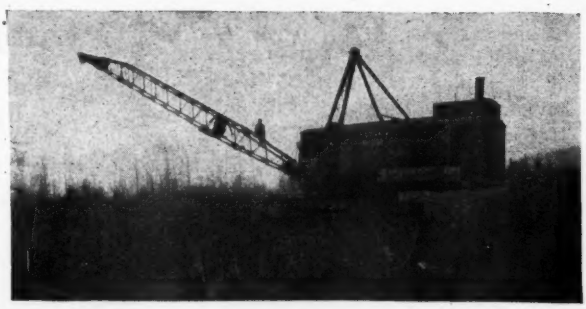
Most of the phosphate is taken from underground workings, which comprise a system of 15 rooms reached by two separate tunnels. Another tunnel has just been begun, but very little rock has as yet been produced at this point. Material is blasted and broken with air hammers operating from an Ingersoll-Rand compressor. It is loaded into cars by hand and drawn by mules. Train loads of rock are brought to the plant by 12 ton Vulcan locomotives, two of which are kept busy around the plant at all times.

An amount of material is also secured by dragline cranes working over areas where the amount of overburden was not excessive and could be removed by the same dragline used in the actual work of excavation. Operations along these lines have been quite extensive and a large amount of phosphate rock has been uncovered and hauled to the plant. The work of excavating is handled by a Model 36 Marion steam dragline with a 1½ yard bucket and by a Model 14 Bucyrus steam dragline with a 2 yard bucket. Both these machines are equipped with caterpillar treads to make locomotion over the loose, uneven ground possible.

For hauling between the tunnel or open workings and the plant, the company maintains a fleet of about 100 dump cars, 20 of which are of 4 yard

capacity, 14 of 1½ yard capacity, and the balance of 1 yard capacity.

Material brought to the plant in these dump cars is hauled up an inclined track by a friction hoist, over a Fairbanks-Morse track scale, and is dumped into long bins from which a rubber conveyor picks it up and feeds it evenly and continuously to a spike mill or roll crusher. Here the larger rocks are reduced to convenient size and the whole passed on to the driers.

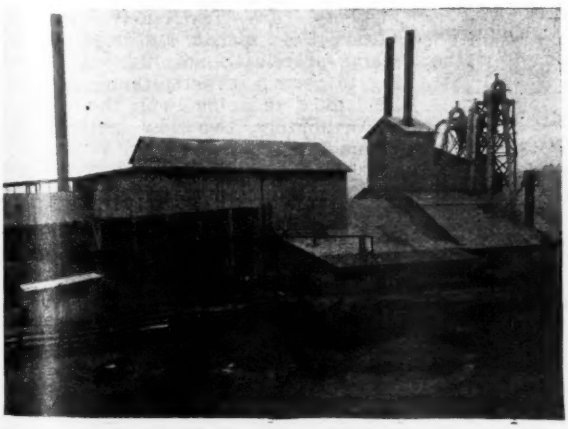


No. 14 Bucyrus Shovel with Clamshell Bucket

No provision is made at this point for the introduction of water, as the plant is operated on the dry process. Conversion to the wet process would not be a difficult matter and would require only the installation of a simple log washer. There is a plentiful supply of water close at hand and the plant already has adequate pumping facilities.

There are two driers, made by the Walsh and Weidner Company of Chattanooga, each 35 feet in length and 66 inches in diameter, and with a capacity of 100 tons each for a 10 hour day. These driers are heated by coal used with a Herdman forced draft system.

After the phosphate rock has been properly treated in the driers, it is passed by a Sturtevant elevator to the green rock storage bin. Such material as is to go to acidulating plants is run into a loading bin from which it is passed to the railroad cars. The material that is to be ground and sold for direct application is carried by a Goodyear tunnel belt conveyor, running under the storage, to a Sturtevant rotary fine crusher, which reduces to ¾ inch size. A large rotary screen with ¾ inch wire mesh is used to classify the product of the crusher and return the oversize for reduction to the required size.



Part of Plant from Side. Cyclones and Inclined Track.

The large green storage bin serves the very useful purpose of making the plant operation quite flexible. It permits the continuous operation of the driers at times when it is possible to dry more than can be ground and keeps on hand a supply of material for the grinding plant when more can be ground than can be dried.

After the phosphate rock has been passed through the fine crush-

er and screen it goes to a battery of 3 Raymond five roller pulverizers, one of which has a capacity of 7 tons per hour and two a capacity of 5 tons each. Here the rock is reduced to the fineness required for direct application and is picked up by a Raymond cyclone and transferred to a silo, from where it goes to bins for bagging or is passed by a screw conveyor direct to the cars.

Bagging is handled by a Bates packer from which the filled bags are passed to a stacking machine and stored in a large room next to the green rock bin and alongside the two loading tracks.

Power for the plant is furnished by an Allis-Chalmers 250 horsepower engine and a 300 horsepower Corliss engine operating from 3 Walsh and Weidner boilers of 150 horsepower each. A line from these boilers also supplies the engine of the hoist used to bring dump cars into the plant. The Herdman forced draft system, used with the boilers, was built by the Jas. Leffel Co. of Springfield, Ohio, and employs an American Blower Co. blower. Two Worthington pumps are used for water supply.

Mr. E. W. Cooper, of Nashville, the Company's engineer, is at present looking into the matter of the erection of an acidulating plant, which will permit the Tennessee Agricultural Chemical Corporation to enter the field as producers of acid phosphate.

The Doe River Sand Co., 208 Main street, Johnson City, Tenn., has plans under way for the installation of a new plant for sand and gravel production on properties lately acquired on the Doe and Watauga Rivers in this section. The works will consist of a washing and screening department; elevator and hoisting equipment; bins for storage, etc., with boiler and engine house for power supply. The company was organized recently with R. N. Campbell as president, who will be in charge of development and operations.

Determining Dust in Air

Sugar Tube Method Explained by Bureau of Mines

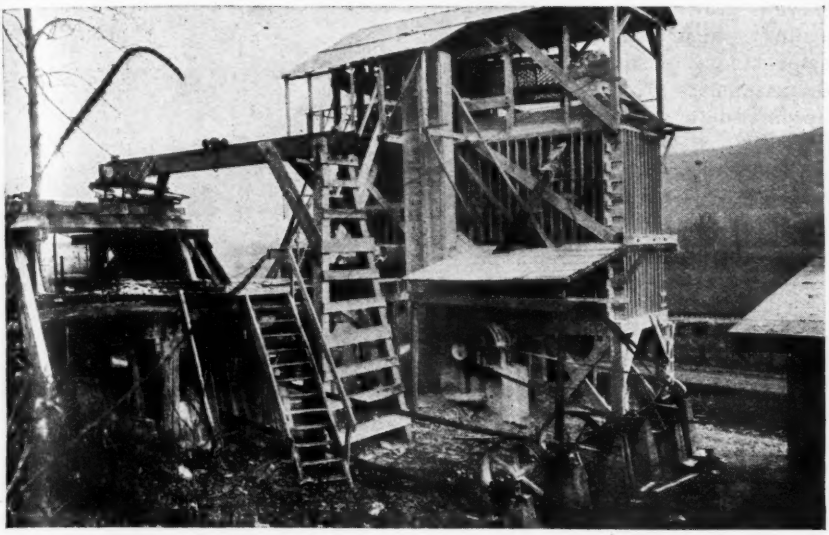
The publication of Technical Paper 278, "The sugar-tube method of determining rock dust in air," by A. C. Fieldner, S. H. Katz, and E. S. Longfellow, is announced by the Bureau of Mines.

In connection with investigations relating to the improvement of health conditions in the mineral industries, the Bureau of Mines has made considerable use of the "sugar-tube method" for determining the nature and amount of siliceous dust in suspension in air. By this method, a measured volume of the dusty air is passed through a tube containing granulated sugar, which filters out the suspended dust. The sugar tube is sent to the laboratory, the sugar dissolved in water, and the insoluble dust filtered off, ignited, and weighed. A portion of the sugar solution containing the dust suspension is made up under the microscope in order that the number of dust particles may be counted, their size and shape measured, and other characteristics noted.

Although this method has been used extensively both in this country and in South Africa, no critical study has heretofore been made of the efficiency of sugar in removing very fine dust particles, which are probably the most injurious. Indeed, the accurate quantitative determinations of such effi- to a measured volume, and an aliquot part (1 cubic millimeter) is placed ciencies are extremely difficult. Particles 1 micron and less in size weigh practically nothing, yet, according to recent investigations, they are held most tenaciously in the lungs.

Fortunately, two new methods, developed in connection with gas-mask research during the war, are now available for determining the efficiencies of filters for very fine particles in air—electrical precipitation of the suspended particles on a tube of very thin aluminum foil, and optical comparison of the Tyndall effect, using tobacco smoke and other suspensions.

This report covers an application of these methods to a study of sugar-tube filters, with especial reference to size of tube, depth of sugar, size of granules and effect of moisture.



Crushing Plant of National Basic Fertilizer Co., Paint Rock, Alabama.

Alabama Agricultural Limestone Plant

THE limestone plant of the National Basic Fertilizer Company at Paint Rock, Ala., while small in size, is well designed, and capable of producing a limestone meal for a large adjoining territory. It is the only quarry and crushing plant for miles around.

The limestone occurs in a hill and its handling between the face and the plant is facilitated considerably by the fact that it is dumped at a point lower than that at which cars are loaded. That is to say, all tracks have a slight incline from the far end of the working to the tipple, so that but little effort is required to push loaded cars to the plant. All cars pushed back up the slight incline are empties.

Rock is shot down from the face in the usual way. A blast hole drill is kept working a considerable part of the time that the plant is in operation, drilling holes for blasts. Material that is shot down is hand loaded into cars of the end dumping type. Stones too large for loading are broken by air hammers to convenient size. The cars loaded with stone are taken along the track leading to the plant and dumped at a No. 6 Gates gyratory crusher made by the Allis-Chalmers Manufacturing Company.

After it has passed to the crusher it is taken up a 60-foot chain bucket conveyor with buckets 17½ inches wide, the whole operating at an angle of 45 degrees. This conveyor passes crushed stone to a rotary screen 15 feet long and 5 feet in diameter, with three sections, having openings, respectively, of ½ inch, 2 inches and 6 inches. The material passed by the largest opening of this screen is dropped by a chute to a Dixie pulverizer, in which they are reduced to a meal and raised by a vertical conveyor into the proper bin. Unloading is done at the side of the plant, along which runs a spur track from the main line of the Southern Railway.

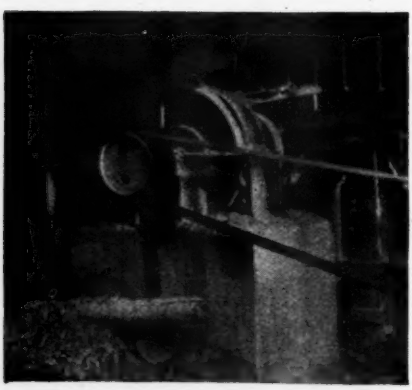
There is provision for loading wagons and motor trucks to supply customers from the immediate vicinity.

All machinery used by the plant—crusher, screens, elevators, pulverizer, are run on a line shaft mounted on concrete foundations just outside of the power house, as shown in the photograph. Power is furnished by steam, operating a number of Ball engines, which are belted to the line shaft. In the power house there is also a compressor system, which passes air through a pipe line to the quarry face for use with air hammers.

Quarry Face of National Basic Fertilizer Co.

Outside the power house, and housed in a small building, is a Novo engine, operating a pump which supplies water for the boilers. Water is obtained from a well close by the pump.

The plant of the National Basic Fertilizer Company is designed for the production of crushed stone in commercial sizes, as well as the pulverizing of stone for agricultural purposes. In view of the local need for road materials, and of limestone meal as a corrective for sour and acid soils, the plant has a good market at its door. With increased activity in this section it will undoubtedly prove very lucrative within the next few years.



Dixie Pulverizing Equipment

In a recent interview concerning valuations of products from Indiana quarries, according to the U. S. census report, Dr. W. N. Logan, geologist of the Indiana department of conservation, says that clay, sand and gravel valuations were not nearly sufficient, but that the value of limestone produced in Indiana was not far from normal. The value of the limestone produced, according to the census report, was $4,619,901.

The Dixie Coal, Lime & Clay Products Co., Dayton, Tenn., is planning for the construction of a hydrating lime plant on property recently purchased at Graysville, Tenn., totaling over 100 acres. The initial plant will have a capacity of about 50 tons per day. O. E. Thomas is president.

The Wheeling Sand & Gravel Co., Wheeling, W. Va., has acquired an established sand and gravel plant in this section, and will operate the property. Extensions are planned for increased output.

Hold Big Joint Meeting

Illinois and Wisconsin Producers Foregather in Milwaukee

"A move in the right direction" was what any stone or gravel man would have said of the joint meeting of Illinois and Wisconsin producers held in Milwaukee on February 24th. Many of those present did so express themselves, and all believed so whether they expressed themselves or not.

The members of the Wisconsin Mineral Aggregate Association held their regular monthly meeting on the morning of the joint meeting day at the Milwaukee Athletic Club. This meeting continued until about noon, when the Illinois members arrived. Both groups thereafter acted as one, and there was in evidence a splendid spirit of friendship and co-operation. This spirit was given an opportunity to reach its proper proportions at the luncheon given by the Wisconsin producers.

Mr. J. K. Jensen, of the Janesville Sand & Gravel Company, President of the Wisconsin Mineral Aggregate Association, presided at the joint session.

The first topic considered was that of cost accounting, on which Mr. J. D. Pierce, Secretary of the Illinois Concrete Aggregate Association read a paper. Mr. Pierce told of the work that has been and is being done for the members of the Illinois association. He showed how this service enabled the producer to get accurate data on the costs of the various operations. He referred to a manual on cost accounting, issued by the association and to be distributed to all members, and suggested that Wisconsin producers could find in it some valuable suggestions.

In the time allotted for discussion of this topic, Mr. John Sloan of the Wisconsin Granite Company and Mr. I. M. Clicquennoi of the Wisconsin Sand & Gravel Company gave able talks, stressing the importance of making sure that whole items of expense are not overlooked and that those included are figured in at their proper amounts.

Mr. A. J. Blair of the Lake Shore Stone Co. read an interesting paper on "Credit and Discounts" and spoke of the difficulty that a number of producers have had in carrying contractors a considerable length of time, and showed how the sale of goods with a liberal discount for payment within two weeks or a month worked out very satisfactorily. Mr. Clicquennoi and Mr. Atwood, expressed opinions that met the approval of the membership.

Mr. S. A. Gibson of the Rockford Sand & Gravel Co. was assigned the topic of "Promotion of Clean and Screened Materials." He spoke of the efforts that are being made in both Illinois and Wisconsin to get more general acceptance of the fact that aggregates for concrete work must be properly washed and graded. Mr. Gibson stated that the average operator of a wayside pit could not get by if he had to stand entirely on his own feet to complete his job. Mr. V. O. Johnson, past president of the National Association of Sand & Gravel Producers, gave a little talk along these lines, as did Mr. Hubbard. Mr. Hubbard spoke of the progress that has been made, particularly around Milwaukee and in Southeastern Wisconsin toward having the true value of commercially produced gravel, stone and sand understood.

The high spot of the meeting came in a speech on freight rates by Mr. Burton H. Atwood, president of the Illinois Concrete Aggregate Association. Mr. Atwood's presentation of his views was clear, concise and thorough. He explained why, in his opinion, the matter of freight rates should be decided by the commission of the various states rather than as a national question. Mr. Atwood's statement is about the clearest explanation of the subject that any attending the meeting had ever heard.

Mr. John Sloan next talked on "Wages and Hours." He expressed the wish of all pit and quarry operators to do what is right with employees in the matter of wages and hours. Besides giving justice to the workmen, fairness in the settling of wage rates gives certain advantages to the producer by reason of the reduction of labor turnover and the gaining of greater loyalty and efficiency.

A number of those present discussed the matter of the payment of dues to state associations by outside producers who are shipping material into that state. It was the sense of the meeting that, for example, an Illinois producer who was shipping gravel into Wisconsin should be assessed for

that gravel not by the Illinois but by the Wisconsin association.

Mr. Malatesta of the Consumers Company spoke on the matter of uniformity in contract forms. He stated that correct forms could be made up only by one who understands the various load factors which would have a bearing on the terms of the contract. He spoke of the necessity of careful analysis of these load factors, and of dealing frankly with other producers.

The question "When is title to material vested in the buyer?" brought out a number of varying opinions, and nothing definite was agreed upon. A number of members believed that in the absence of a contract definitely covering this point, ownership changes to the contractor as soon as a bill of lading is issued by the railroad. Mr. Atwood analyzed the subject quite well. He referred to the two ways in which goods are sold, by warranty and by sample, and showed how the particular circumstances in this regard that attend the sale implied one kind of contract or another, by the terms of which title to the material could be worked out at any time after agreement to buy it was made.

The relative advantages of verbal and written contracts were discussed at some length. A point that was stressed was that indefiniteness in contracts frequently worked hardship on the producer by causing him to produce material above the amount that the contractor, overestimating his requirements, would need. Mr. R. W. Sherer of the Western Lime & Cement Co. gave expression to this view. A straw vote disclosed that about half the members were in favor of the written and half in favor of the verbal contract.

After discussion on this last topic the Illinois members gave a rising vote of thanks to their Wisconsin hosts, and the Wisconsin men a vote of thanks to the Illinois producers for the time and expense to which they had put themselves to attend the meeting.

The United States Gypsum Co., Genoa, Ohio, has construction under way on six additional kilns at its local plant, and plans to have the extension ready for operation at an early date. The kilns will be electrically operated.

Industrial Service

Mr. Waller Crow, well known in the pit and quarry field, has opened up offices at 327 S. La Salle St., Chicago, as Waller Crow, Inc., a corporation which places at the disposal of these industries the services of a trained consulting, designing and engineering corps.

Until recently Mr. Crow was with the Schaffer Engineering & Equipment Co., of Pittsburgh, and previous to that connection was engaged in consulting work

Waller Crow

for some of the largest mineral producing companies of the country. His experience has also included geological surveys in many parts of the United States.

And added to these qualifications is Mr. Crow's natural tendency to hold himself to practical and economic considerations; to keep away from fantastical dreams, however appealing they many be, and keep in mind the fact that the function of an industrial plant is to turn out a product and make money by so doing.

His service is broad enough to include advice on problems of financing, operation and business management, as well as the purely technical work of design, construction and equipment.

Bureau of Mines Gives Valuable Help to Quarrymen

ON February 1st, the new rules and regulations of the Wisconsin Industrial Commission regarding safety in quarries went into effect, and operators in that state have since been taking steps to get their quarries in condition to meet all the requirements of the new code for next season's operations. The various provisions were fairly easy; in fact, only one appeared to offer any difficulty at all. This was the clause to the effect that each quarry must have at least two men trained in first aid work who would be able to give immediate attention to injured workmen. But this, too, was taken care of, and in a very practical and effective way.

The Wisconsin Industrial Commission effected a co-operative agreement with the United States Bureau of Mines whereby mine safety service car No. 10 with its trained personnel gave first aid training in the Wisconsin quarries for a period of two months, beginning on January 3rd. This car made stops of one week each at ten centers in various parts of the state where workmen from all quarries close by could be schooled.

The primary purpose of mine safety car No. 10 is, as the name indicates, to make the occupation of the miner a less hazardous one. The men who travel with the car are skilled miners themselves, and are able to handle the safety problems of the miner in a practical way. In addition to the work of instruction they are always subject to call at any time that their services should be required for rescue work around burning or caved-in mines. Quarries are a little out of their regular field, and are covered only on special occasions such as the one in question.

The car is in charge of Mr. A. J. Martinson, who is assisted by Mr. M. B. Orfald. Both of these gentlemen are practical miners, and are well fitted for the useful work they are doing. They are particularly competent to give instructions in first aid work, for they themselves are often called upon to give first aid to wounded men at times when their car is rushed to the scene of a mine disaster.

The course of instruction that was given at the various Wisconsin points covered a period of three days, on each of which five hours was devoted to intensive schooling in the proper methods of rendering relief to the injured. Of the fifteen hours thus included in the complete course, not over three were devoted to lectures, and twelve were taken up with actual practice. At the end of the course each man who completed the prescribed studies was given a certificate to the effect that he is qualified to render first aid service.

On the first day of eacn course Mr. Findeisen of the Wisconsin Industrial Commission gave a talk on the new Wisconsin quarry code, its provision as to first aid work and the agreement between the state and federal agencies which resulted in the course of training then being conducted. Mr. Findeisen was then succeeded by Mr. Orfald, who spoke briefly and practically of the benefits of first aid, and what the United States Bureau of Mines is trying to accomplish in this direction. He gave an outline of the course, touching briefly upon its salient features and the way in which the work would be divided over the fifteen hours alloted. This talk can hardly be regarded as a lecture, but rather an introductory announcement on the work to be done. He then entered directly

into the first subject, that of bandaging.

First the use of triangular bandages and the ways in which they are made to cover all parts of the body were described. Then the use of the compress bandage was taken up, together with the use of the tourniquet, and the kerchiefs, towels, etc., used with small stones or blocks or knots tied at the proper points.

It is the purpose throughout to show the latest approved methods of rendering aid to the injured, and all appliances which fit well into this work were discussed and described at

Ready to Meet Any Condition Surrounding the Injured

indication of pressure points. After all pressure points had been indicated, Mr. Orfald explained how it is possible to use them to stop arterial and venous bleeding. All the men in the class were made to locate various pressure points on other men, and were taught how to improvise tourniquets and to apply them properly. The instructions given at this point were typical of those throughout the course, in which the men were taught to use the nearest available material in the most effective way. Training along these lines is particularly valuable, as, when an accident occurs, too much time is lost in procuring regular appliances. Tourniquets may be made with belts, suspenders, neckties, handlength, but emphasis was placed strongly on the fact that the man who would be an efficient first aid worker must have the ingenuity to adapt the nearest things at hand to his purpose.

On the morning of the second day the work of the previous session was reviewed and the men were paired off to practice the application of various bandages on one another. At this time also the application of triangular bandages to all parts of the body not covered on the first day was taken up, with particular reference to bandaging for burns and scalds.

Then followed a short talk on dislocations. To show the way in which dislocations come about some time was spent in studying the anatomy and

mechanics of the body. The various joints were described and the manner in which they operate was pointed out. Here the instructor drew the attention of the first aid man to the limitations of his work. He stressed the point that the first aid man should not attempt to set any dislocations except those of the fingers and toes. The best he can do in dislocations of the larger joints is to fix them up so that the injury will not become worse before a doctor can be called. The application of roller bandages to the fingers and hands was carefully described. A talk on the method of rendering first aid to a man with a broken collar bone completed the morning session.

On the afternoon of the second day the subject of fractures was given attention. The proper method of splinting various fractures was indicated, and attention directed to the care necessary in handling fractures, and the proper precautions to take to prevent infection of compound fractures. The various injuries of this class were then classified and described as of the forearm, upper arm, leg and thigh. Here were also included cases of broken ankles, wrists, knees and elbows.

All during the time that these instructions were going on the men had been working in groups of four or five splinting and bandaging various hypothetical injuries. As the instructor touched upon each point he demonstrated the bandage and splint to be applied, and made all of the men apply the bandage themselves, each man taking his turn laying patient for his particular group. The men were instructed to use prepared splints if these were available, to improvise if they were not. It was shown how a cane, an umbrella, a ruler, or any object sufficiently long, flat and rigid for the particular splinting operation in question could be applied.

The third day began with an explanation of the way to take care of a man with a broken back. To clarify this subject it was shown how the spinal column is made of thirty-three bones that serve as a conduit for nerves and blood vessels. Mr. Orfald told of the importance of taking care of this kind of injury so that the patient will reach the doctor or surgeon in the best possible condition. The class was divided up into groups of five or six in which each took his turn as patient and first aid operator. It was shown how to improvise a stretcher for any type of injury but particularly for a broken back, and how to transport the injured man, also how to treat a man suffering from a severe shock to the nervous system. Treatment of a person who has fainted and the proper use of stimulants were also covered.

On the afternoon of the third day the subject of resuscitation was gone into. The Schaefer and Sylvester methods of artificial respiration were described and the relative advantages of each described for various conditions. It was stated that the use of mechanical resuscitators is not recommended by the United States Bureau of Mines and that these appliances are never employed in their own work. The nearest approach to a mechanical resuscitator is the simple oxygen inhalator which is used in conjunction with artificial respiration. Even the inhalator is used only when there is at hand some individual who is entirely familiar with its operation.

The men taking this first aid course were taught to rely entirely upon artificial respiration to effect a recovery in cases of drowning, electric shock, asphyxiation, and exceptionally severe shocks to the nervous system. The class was given ample time to practice artificial respiration by both the Schaefer and Sylvester methods.

This completed the actual work of the course except for the talk that Mr. Orfald gave on general directions for rendering first aid, and in which he laid special emphasis on the necessity of

doing the most important thing first, of keeping cool, of keeping bystanders away, of summoning a doctor while giving first aid, and last but not least, of being cheerful and confident. He always warns men who have completed this course that they are not to attempt to perform the duties of a doctor—that their work is merely to relieve pain as much as possible at the time and to prevent the injury from becoming worse; that the first aid man should bear in mind that, when the patient is delivered to the doctor or surgeon, his work is finished; that first aid work is nothing but the exercise of common sense guided along approved lines by the knowledge of a few fundamental facts in the care of the injured.

The large photograph shown here was taken on the last day of the course that was held at Milwaukee, on the week of February 6th to February 10th. All sessions were conducted in the Milwaukee City Hall, and were attended only by representatives of the various quarries in that section of the state. The photo illustrates well the practical character of the work and the important service the crew of mine safety service car No. 10 are rendering to this industry.

The Giant Portland Cement Co., of Philadelphia, reports for the year ended December 31, last, gross receipts of $2,070,673, net operating earnings $287,452, bond interest paid and accrued to December 31, $27,750, net profit for year $149,365, balance transferred to surplus after preferred dividend, etc., $43,123.

The Louisiana Sand & Gravel Co., Monroe, La., has been formed with a capital of $100,000, to operate large sand, gravel and crushed stone properties in this vicinity. A plant will be established at an early date. T. E. Stephenson is president, and C. C. Houston, secretary and treasurer.

The Arrow Sand Company, of Columbus, Ohio, has increased its capital stock from $150,000 to $200,000.

Accident Prevention

DURING the winter and early spring many rock producing plants and sand and gravel operations have their machinery overhauled and repaired. As this is being done thought and care should be given to so protect machinery as to prevent accidents.

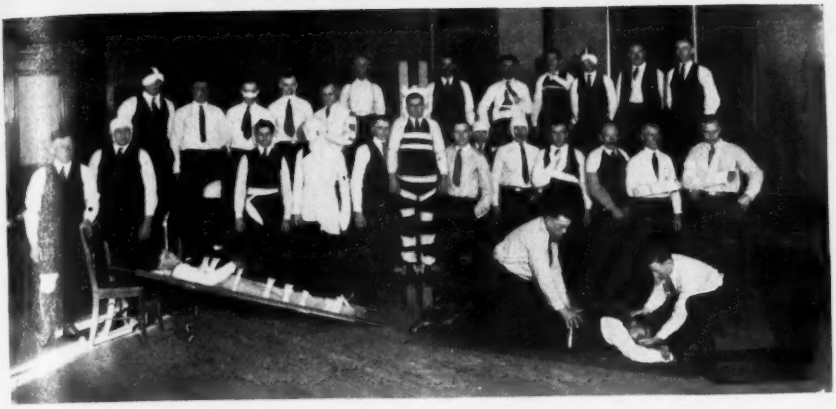
The quarry industry is one of the most hazardous, and it is a fact that most accidents are due to carelessness. Although this is true, many operators are to blame for not protecting machinery properly. If the proper protection is given, then even if men are careless, no one will be injured.

Two men were working on an elevated platform at a crusher plant and one kicked a Stilson wrench with his foot so that it fell off the edge of the platform. At that instant a man walked under the platform and the wrench hit him upon the head knocking him to the ground. If a narrow strip of board had been nailed around the edge of this platform, the wrench would not have fallen to the ground.

It was a careless act that caused the accident, but the operator could have prevented it by protecting the platform. A man by a careless motion or a torn jumper gets caught in some gear wheels, but if the proper guard had been placed around the gears such accidents would not occur. It is these and many other things that should be given attention when plants are being repaired, set in order, or being enlarged.

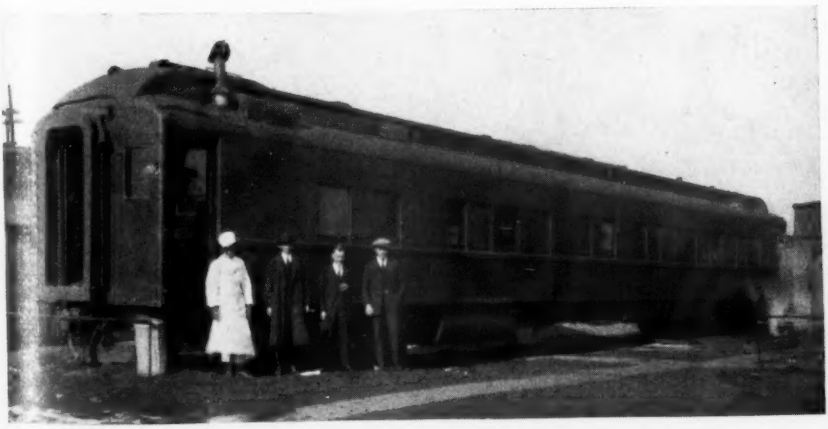
Accidents not only cause pain and suffering but they are commercially expensive, meaning lost time and money to both employer and employee.

William Johnson, L. R. Henley and J. A. Schellenger recently organized the Elliston Gravel Company, at Bloomfield, Ind., for the purpose of engaging in the sand and gravel business. The newly organized company has a capital stock of $25,000.



By the third day, all members of the class were expert first aid men.

The mine safety car at scene of a big mine fire.



Mine Safety Car No. 10 and its personnel. Each man, including the chef, an expert in his line. Mr. Findeisen, second from left, Mr. Martinson, Mr. Orfald.

Plymouth Locomotives On Welland Canal

Statistical

Welland Canal connects Lakes Erie and Ontario, whose difference in level is 326 ft.

Canal crosses the Niagara Peninsula about 10 miles west of Falls.

Length of Canal, miles..	25
Number of Locks.....	7
Usable Length, feet.....	800
Usable Width, feet.....	80
Lift of Locks, feet.....	47
Width on Bottom, feet..	200
Width at Water Line, ft.	310
Depth of all Structures, ft.	30
Time to fill Lock, minutes	8
Vessel to pass through Canal, hrs.	8
Number of Bridges.....	22

Estimated cost at 1912 prices was $50,000,000.

FOUR PLYMOUTH Gasoline Locomotives are a part of the equipment of Doheny, Quinlan & Robertson, who have contract for excavation and cement construction of a section of the Welland Canal,—the world's biggest project now in work.

The camera shows two Plymouths, handling large cars and massive buckets filled with wet batches to be hoisted and poured into the great forms of the retaining walls. Ask us for Literature.

The Fate-Root-Heath Co.
Plymouth, Ohio, U. S. A.

Historical

First canal completed in 1829. Connected by feeder canal in 1835. Had 40 locks, 110 feet long and water depth 8 feet.

Second canal opened in 1845. Locks reduced to 27, each 150 feet long and 27 feet wide, 9 feet deep. Cost, $7,693,824.03.

Third canal opened for traffic 1887, with locks 270 feet long, 45 feet wide and 12 feet deep.

Third canal cost to April 1, 1919, for construction, $23,337,403.16.

Fourth canal now building is reflected in panel opposite, and has capacity to admit ocean steamers to Great Lakes ports.

Estimated cost at 1912 prices was $50,000,000.

The Fate-Root-Heath Co.
Plymouth, Ohio, U. S. A.

ocean steamers to Great Lakes ports.

Signal Mountain Portland Cement Plant as it will appear when completed.

To Erect New Portland Cement Plant at Chattanooga

THE Signal Mountain Portland Cement company has begun work on the construction of a big modern 5,000-barrel capacity cement plant on its property at the foot of Signal Mountain, near Chattanooga, Tennessee. Detailed plans for the building of the plant are ready and A. C. Deer, general manager of construction has established headquarters on the ground from which he will direct the work. The work of building will furnish employment for about 300 men.

The Signal Mountain Portland Cement company, which promises to become a leading southern industry, was organized under the laws of the state of Delaware, Aug. 4, 1920, and was domesticated in the state of Tennessee, Aug. 17, 1920. The personnel of the board of directors includes business men of wide prominence, some from Chattanooga and elsewhere. On the board are: President, John L. Senior, president Peninsular Portland Cement company, Cement City, Mich., and director of Trinity Portland Cement company, Dallas, Tex.; chairman, W. A. Sadd, president Chattanooga Savings bank; treasurer, J. P. Hoskins, vice-president and cashier of First National bank, Chattanooga; Charles Closz, president of the Closz Manufacturing company, Webster City, Iowa; Charles W. Howard, manager industrial board of the chamber of commerce, Chattanooga; A. C. Deer, general manager Peninsular Portland Cement company, Cement City, Mich.; F. A. Stephenson, president Ideal Sand and Gravel company, Mason City, Iowa, and Ralph Law, formerly of Mason City, Iowa, president of the Law Land company.

Selected members of the board serve as an executive committee, with the president of the company, John L. Senior; chairman, W. A. Sadd; treasurer, J. P. Hoskins, and secretary, Ralph Law.

The location of the new plant will be about five miles from Chattanooga. There is a mile of water front along the Tennessee river, from which point the company's land slopes upward and lies along the mountain side. Directors of the company regard the location as peculiarly fortunate, not only because of the proximity of necessary raw material, but because of the economic value of the transportation facilities that will be available to the employes. It is pointed out that the railway of the Chattanooga Traction company runs through the property and the schools, churches and theatres of Chattanooga will be easily accessible. This will eliminate the usual necessity for the building of employes' houses, and make possible for the company, a saving of approximately $200,000.

Chattanooga was selected as a particularly fine location for the manufacturing and distribution of cement for quite a number of reasons. Chief among these is the proximity of plenty of raw material and an adequate labor supply, and the growing demand for the product in the territory served. Of the 115 cement plants operating in the United States only 13 are located in that group of states which comprise the section of the south, southeast and southwest. These plants produce less than 10 per cent of the cement manufactured in the whole country.

Markets are assured all over the projected distribution area. The new enterprise is surrounded by prosperous states in which the demand is continually growing. The completion of the Wilson dam at Florence, Ala., will permit the shipment of a considerable

Signal Mountain Portland Cement Plant as it will appear when completed.

part of the output by water over a large territory, and the other parts are served by good rail connection.

The plant will be constructed along the most modern and approved lines. The management contemplates the finest plant in the south and is sparing no expense to bring this condition about. No new cement plants have been put in operation in this section for the past ten years, although quite a few have been modernized by additions and alterations, and the Signal Mountain plant will enjoy the distinction of being the only one built from the beginning along modern lines.

It is estimated that the operation can be carried on with a force of 130 men.

The building of the plant has been intrusted to engineers of national reputation and the entire organization is perfected locally by the fact that the management includes Chattanoogans known throughout the south as builders.

The raw storage room will be 650 feet long, and 60 feet wide, with a capacity for rock storage of 15,000 tons; shale storage, 5,000 tons; coal storage, 5,000 tons; clinker, 150,000 barrels, and gypsum, 500 tons. An elevated railway carries the raw material to the storage department, where it is dumped automatically. By means of an electric crane the rock and shale are transported from there to the raw grinding department, where the mixture is analyzed by chemists, and so treated as to insure the proper proportions. It is then carried to the slurry storage department, where its perfection is made doubly sure by a second analysis. While this is in process the coal is brought from the storage department to the drying and grinding department and thence to the clinker burning department, always by means of automatic machinery, so that only two or three men to each shift are required to operate each of several departments. When it is finally transported to the sacking department, the amount of man labor required will vary with quantity shipped.

Another very satisfactory truth touching this new plant is the fact that it is so arranged as to permit of easy and convenient growth. Ground room is left for the considerable expansion of each department with minimum expense, at such time as the growth of the plant requires it. That time is sure to come in the normal course of events and it is too frequently the case that builders overlook this inevitable consequence of prosperity, thus entailing double expense when it becomes necessary to expand the plant.

"I am proud of the fact," says Mr. Deer, "that our machinery is not only thoroughly simple and modern, but that it is standardized in every detail. Parts of machinery used in each department are interchangeable with parts used in the other departments; thus much of the expense of repairs is eliminated. We shall have a water tank for fire protection with a capacity of 100,000 gallons, with hose connections extending over the entire plant."

The plant will be located on the Dixie highway, which intersects the entire length of the property. For the avoidance of possible accidents it is expected that a tunnel will be built under the road for the transportation of plant products. The Dixie highway is paved to within a quarter of a mile of the plant and the remainder of the highway is a finished chert road; thus good traffic to the city is assured in all seasons. The fact that the plant is within the shipping district of Chattanooga will give access to all the principal railroads of the south. The Tennessee river will afford water supply for the site chosen as well as river transportation for coal and finished products.

Outcroppings of suitable coal have been found within a few miles of the plant and there are similar veins along

Mr. John L. Senior
President Signal Mountain Portland Cement Co.

the river front. Limestone and shale, the two other requisites to the manufacturer of portland cement, have been found in close proximity to the plant in quantities sufficient to last a hundred years.

Favorable analysis has been made by geologists and chemists of wide reputation, including Wilbur A. Nelson, state geologist for Tennessee. Mr. Nelson closed the written report of his analysis with these words: "The above analysis as made by this office from samples which I took from your limestone and shale localities, show that you have a material well suited for the manufacture of high-grade portland cement."

The deposit of lime rock, it is explained, lies on the mountainside with an average depth of 250 feet, and is located above the site, which will greatly facilitate transportation of raw material to the plant.

A New Industrial Locomotive

The Industrial Equipment Company of Minster, Ohio, formerly The Cummings Machine Company has recently placed on the market a new Model Seven Ton Locomotive which is known as their Model "F."

In addition to being a new size or capacity the manufacturers claim there are incorporated in this Locomotive quite a number of special features. There has been no change, however, in the method of transmitting power from the Engine to the Wheels as the new Model is of the Friction and Chain Drive which method of transmission has been successfully used by them for the past five years.

This Locomotive has an all steel box girder construction Frame and many advantages are claimed of this construction; special high manganese chrome alloy steel is used in the Axles, Jack Shaft and Friction Disc Shaft and also Carnegie Rolled Steel Wheels are used.

The well known Buda Engine is incorporated and also such standard and recognized equipment as Westinghouse Starting and Lighting, Stromberg Carburetor, Duplex Governor, Splitdorf Aero Model Magneto with enclosed Impulse Automatic Starter, Hyatt Roller Bearings, New Departure Ball Bearings, Willard Storage Battery, and Diamond Roller Chain.

To insure maximum transmission of power and proper alignment of all working parts the Engine and Drive Disc Assembly are combined in one complete unit with a two point suspension, the recognized standard today in the Automotive Field.

A special feature is claimed in the stationary Hand Wheel method of shifting the Fibre Wheel across the face of the Disc in order to get forward, reverse, or change in speeds.

The Industrial Equipment Co. has issued a new Catalog descriptive of this new Model which may be obtained by addressing the Company at Minster, Ohio, or the Herbert Crapster Company, Inc., their Eastern and Export Department at One Madison Avenue, New York City.

Sand and Gravel Men at New Orleans

Continued from page 53

probability be confronted with the most severe congestion of railroad traffic and the greatest inadequacy of railroad facilities ever experienced in our history."

I venture the assertion that if there were no other reason for maintaining a strong National Association, the matter of protecting our industry from an inequitable distribution of cars would fully justify its existence.

The impression must not be gained fro mthe foregoing discussion of our transportation problems that the questions of freight and car supply have constituted our whole work; we have not been neglectful of other activities in which the Association has engaged to the benefit of the industry at large, which may be summarized as follows: Membership, finances, Federal legislation, specifications, cost accounting, liability insurance, co-operation with Government departments.

It is perfectly plain that the National Association must represent a majority of the producers engaged in the business if it is to truly speak for the sand, gravel and stone industry. Furthermore, it is only fair that every producer should bear his portion of the expense of the organization, since all share alike in the benefits. Besides, the money paid as dues by one member is rendered effiective in direct ratio as it is supplemented by dues contributed by other firms. The Executive Committee, therefore, has deemed it a proper and necessary function of the Association to conduct a campaign for increased membership, it being confidently felt that if the producers in all parts of the country are made cognizant of the assistance which the National Association renders to the industry, they will readily do their part in maintaining the organization.

The membership of the Association until last year was made up primarily from producers in the Central States. During the year 1921 we have held meetings in various parts of the United States and have succeeded in enlisting the active support of many new members. We have covered practically all the outlying districts, including the far western states; only recently a substantial remittance was received from a large producer in California, giving evidence of the interest which the Association has aroused in that section of the country.

We have secured the support of several large producers in the South and the officers of the Association have felt keenly gratified by the manner in which the Southern producers have rallied to our support.

At most of the points visited, steps were taken to form state or district associations and the majority of them are now progressing rapidly to a point where they are the local safeguard of the industry.

Despite the business stagnation which the country endured during the past year, we have been able to conduct the Association in a fairly satisfactory manner from a financial standpoint. Our income has been substantially increased and we are encouraged to believe that the coming year will witness a return of normal business activity within the industry, and that as a consequence, the Association will be financially able to carry out the program before it.

In Touch with Legislation

The location of our headquarters in Washington has enabled us to keep in contact touch with legislation developments having a direct or relative effect on the industry.

Our most potent activity along this line during the past year, aside from the proposed amendment to the Transportation Act, has been in cooperation with the American Association of State Highway Officials, resulting in the passage of a satisfactory Federal Aid Bill. The Bureau of Public Roads, under the efficient direction of Thomas H. MacDonald, will continue, under the revised law, to have charge of the administration of Federal Aid funds, this arrangement being contrary to the original recommendations of the Senate Committee on Post Offices and Post Roads, which planned to create a Federal Highway Commission, with allotment of Federal Aid funds to interstate highways only. If this policy had been established, it is believed that it would have worked to the great detriment of our industry.

Through the membership of your Executive Secretary on Committee C-9 and Committee D-4 of the American Society for Testing Materials and on Committee E-5 of the American Concrete Institute, it has been possible to protect the interests of sand and gravel producers in the formation of typical specifications covering the use of our materials. It is obvious that it is highly important that we should maintain a close cooperation with these scientific agencies in order that the development of proper and economical specifications may be assured.

We have also cooperated with the Joint Committee of Engineers in the designing of standard specifications for concrete, and it has been our privilege to be instrumental in contributing to the work of this committee by submitting some pertinent suggestions pertaining to the production and use of our materials.

At our solicitation, the Bureau of Public Roads conducted a series of tests to show the effect on the resultant concrete of different percentages of materials below one-quarter inch in the gravel aggregate, when various proportions of cement are used. These tests were made at Purdue University under the direct supervision of Dr. W. K. Hatt.

The matter of uniform cost accounting for our industry has been given consideration by a special committee, of which Floyd Goodrich is chairman. The committee has made some preliminary investigations on the subject and expects to be ready to make a report carrying definite recommendations in the near future.

The question of liability insurance is a live issue with sand, gravel and stone producers, for it appears that they are paying an unreasonable rate as compared with other operations of greater hazard. We have the matter up with the National Workmen's Compensation Service Bureau, and are hopeful of getting a more favorable manual rating and classification established, which is the basis for charges of all insurance companies, whether old line, mutual or reciprocal.

Congressman Sanders

The western Indiana producers were fortunate in being able to get their representation in Congress, Hon. Everett Sanders of Terre Haute, to go with them to New Orleans. Mr. Sanders is a member of the congressional committee on interstate and foreign commerce, and came to the platform with an intimate knowledge of the peculiar problems of the sand and gravel industry. After reciting the evils of transportation which have confronted producers, Mr. Sanders said:

What is the best course to pursue to remedy the evil? Should there be a change in legislation affecting the roads? There have been three propositions urged: First, it is contended that the provision of the Commerce Act granting the right to the Commission to use priority orders unjustly discriminates against the sand and gravel industry. I think these provisions should be carefully studied with the view of securing such an amendment from the Congress as will protect the industry in its right to an equitable distribution of cars. This matter is not pressing now, but since large bodies move slowly, the Association should not wait until the pinch comes, to make preparation.

For instance, while it may be all right to give coal a preferential right of shipment in emergencies, the preference ought always be measured by the emergency. For instance, under preferential orders in time of great scarcity of cars, coal was sent to factories manufacturing toys, while cars were refused to gravel plants when the gravel would have been used to complete the construction of a road which would have been of the greatest benefit to the public. I do not think that Congress will over entirely eliminate priority orders in cases of emergency, but I feel that an effort with considerable hope of success could be made to hedge the priority provisions with such limitations as to make it accomplish only the purposes originally intended, that, is, to meet the real emergency.

The second suggestion is to repeal the provision of the Transportation Act giving to the Interstate Commerce Commission supervisory power over freight rates within a state when it is found that they are unjustly discriminatory or unduly preferential in view of the rate fixed on interstate commerce.

Upon that question I assume that there will be differences of opinion

amongst the several members. There may be some instances in which greater benefits will accrue to certain producers by giving to the State Commission exclusive power. Viewing the interests of the industry as a whole, I feel very sure that the law is more advantageous as it is now written.

Suppise there is a plant within shipping distance of Chicago on the Illinois side. Suppose there is one within a like shipping distance of Chicago on the Indiana side. The Interstate Commerce Commission has exclusive authority to fix the rate of the shipper from the plant in Indiana to Chicago, and the Illinois Commission has the power to fix the rates from the plant in Illinois to Chicago.

If the Interstate Commerce Commission hasn't the power to prevent discrimination, the plant in Illinois may be able to secure from the State Commission a rate which will absolutely destroy the power of the Indiana plant to compete. This sort of situation ought not to exist, and in the remedy in the present law is adequate to secure immediate relief. While it might be to the advantage to the Illinois shipper, in the instance I have cited, if it were the question between an Illinois shipper whose products went into St. Louis, Mo., and a Missouri shipper whose products went to the same point, the reverse would be true.

The third suggestion is to repeal the rule of rate making in the Transportation Act. This ought not to be done. This was a rule which required the Interstate Commerce Commission to "Establish rates so that the carriers as a whole (or as a whole in each of such rate groups or territories as the commission may from time to time designate) will under honest, efficient and economical management and reasonable expenditures for maintenance of way, structures and equipment earn an aggregate annual net railway operating income equal as nearly as may be, to a fair return upon the aggregate value of the railway property of such carriers."

For a period ending March 1, next, the Act specified that a fair return was 5½ per cent (and under certain conditions 5 per cent) on the property value. This is sometimes erroneously referred to as a guaranty. It was not a guaranty, was never meant as a guaranty, and cannot possibly be construed as a guaranty. As a matter of fact, the roads earned less than 3 per cent on the value of their property as fixed by the Interstate Commerce Commission for the first year after the expiration of the six months guaranty period and are earning less than 3 per cent now, according to the report of the Interstate Commerce Commission. The roads suffer the loss, however, and the Government has not agreed to and will not make up the difference, as would be the case if there was a guaranty.

There is an important provision coupled with this rule of rate making that where any road earns more than 6 per cent, one-half of the excess shall be held as excess return and be paid to the United States Government. Under this provision the Government will receive millions of dollars this year.

Thus the rule of rate-making, improperly called a guaranty, is to serve the purpose of preventing the Commission from establishing rates that would not be a fair return on the actual property value (which by the way is also protected by the Constitution) and at the same time of preventing the strong roads from getting unconscionable return.

Whatever may be said of the wisdom of these provisions, it can unquestionably be said, that neither the guaranty for the six months, nor the rule of rate making is responsible for high freight rates. The obvious proof of this is that the six months guaranty was not added to freight rates, but was paid out of the treasury just like the deficit under Federal control and rule of rate making did not yield either 5½ or 6 per cent, but less than 3 per cent on the property value of the roads. This rate of return would have been commanded by the provision of the Federal and State Constitution against confiscation of private property.

There is just one thing that is mainly responsible for high freight rates and that is the high operating expenses of the roads. If the rates were reduced so that the roads would not receive any net return on investment, the reduction would not be a substantial one, and would give but little relief.

From September 1, 1920, to August 31, 1921, the year following the guaranty period, the total operating revenues of the class I railways, which represent 95 per cent of the revenues,

was $6,045,338,100. Of that, there was a net railway operating income of $530,655,927. This is but 2.9 per cent on the property value of the railroads. The total operating expenses, including taxes, were $5,514,682,173. It is clear that relief is not in providing less than the 2.9 per cent return which is represented by the *500 millions*, but in attacking the operating expenses which represent *5,500 millions* of the amount paid in rates. The latter is about eleven times greater than the former.

How about arbitrary reduction below cost to help business?

This reduction in operating expenses is being made. Reductions in the cost of materials and equipment, reduction in labor costs have been of a substantial nature, and reduction in freight rates are following. The Transportation Act has weathered two threatened strikes. It has weathered almost two years of the most trying days of readjustment, and in spite of business depression, it has so sustained railroad credit as to prevent the financial disaster which would have resulted if railroad failures and receiverships had occurred. The railroads, as an instrumentality for transportation, have been preserved and improved. The net earnings are moving upward as the operating costs are being lowered. This will be accelerated as the increase in business shall increase the freight and passenger revenues. Capital for additions and betterments can now be obtained. We thus have the safe and secure basis for reduction in freight rates in the full measure that is permitted under sound economic principles which will at the same time sustain an adequately equipped and properly operated transportation system under private ownership and operation.

Having advised you to seek legislative remedy on the question of car distribution, and having undertaken to show that no legislative remedy can aid in reducing freight rates, I don't want you to think that I do not believe you can get the desired reduction in freight rates. I think the rates on sand and gravel are relatively higher than on other commodities. Your remedy, however, must not be in legislation, for under the present laws you have the right, first, to a reasonable rate; second, you have a right to a rates which is not discriminator, as between different commodities, and you have the right to see that your competitors' rate does not so discriminate against you as to keep you out of a market to which all are entitled. The remedy is administrative, and will be affected just to the extent to which you apply your energies in securing the administrative relief. The existence of this Association forms the basis for the most effective work to be done in that respect. You must bring up all your forces to make war on high freight rates. Make out your cases clearly, overwhelm the tribunal with proof. Let all the members of the Association give closest co-operation; furnish your Washington office with the proper data, so that the facts may be presented to the Commission.

Business is already on the mend. With the increase of business and the increase of revenue on the railroads, freight rates can come down. There is every reason for optimism in the sand and gravel industry for several years to come. I personally know there is contemplated appropriations of fifty or one hundred millions of dollars annually to meet like appropriations from the States for the construction of highways alone in the next three years. While the high surtax, in which I do not believe, will retard business to a certain extent, your business is the one business which it will help. Municipal bonds and bonds of the States and State agencies for road and street building are free from Federal taxation, and a high surtax creates a ready market for such securities at a reasonable rate of interest. Looking the whole situation over from your viewpoint, it seems to me that there is every stimulus in the world for successful business.

George Kilian

The association plans to do some active work looking toward better cost accounting systems for its members; and as an introductory Mr. George Kilian, Secretary of the Dixie Portland Cement Company, Chattanooga, Tenn., gave a paper on this subject. He said in part:

If you do not know correctly the actual cost of your product, you are not safe in competition, and sooner or later will fill your alloted space in the industrial graveyard. You cannot now consider your business as one of self-interest, having no connection with industry as a whole, and so have

no moral right to let your business run wild.

As an association, the gathering of actual cost figures or percentages is not permissible, but the building up of the fundamentals of a system applicable to this industry is not only sanctioned by departments of our government but encouraged, this work to include consideration of the elements of cost entering into the process and the proper segregation of these elements. Following is an extract from an interchange of letters between the Fabricated Production Department of the Chamber of Commerce of the United States and the Federal Trade Commission:

"For a trade association to set up and induce the use by its members of a scientific and accurate plan of cost accounting is not only legal but highly beneficial to the individual members of the association. The use of this legal and highly beneficial information by each individual in establishing his own production cost and determining his own margin is entirely proper. If, thereafter, the association attempts to induce its members to disregard their own varying figures and use a common average or uniform figure of cost or margin or both, it has departed from its proper position of instructor and may easily take on the appearance of a price fixing combination in restraint of trade or in suppression of competition."

Modern machinery, if kept in good repair, may continue to produce far beyond the average life given in the mortality table, but with the rapidity with which improved and more economical types are put upon the market, the item obsolescence should be given careful consideration.

How far does cost accounting pay?

If you know the real total cost of your product, you will seek a market giving your stockholders a fair return on their investment, at the same time preserving their capital account intact, and, competitive conditions preventing this, then your only recourse is to reduce your production costs,

Your plant should be departmentalized—or divisions established to permit of monthly comparisons—as only in this manner can the "leaks" of the business be discovered. Your operating force is as keen to obtain results as you, but unless the office can localize the cause of increasing costs your superintendent must spend time necessary to locate the symptoms and detract from his efficiency as an operator.

The day when the back of an envelope was sufficiently large for your calculation of a year's earnings is past. There are so many contingencies entering into a business now that nothing but an accurate portrayal of your real costs is sufficient.

Few men will willingly sell their products below cost, but with a false knowledge of this factor little wonder that so many enterprises fail. Yours may be an unequal and an unfair fight; however, if your competitors are unenlightened as to their own cost of production, it then behooves you to preach this gospel regularly.

Edmund Shaw

It is unfortunate that one of the highest spots of the convention is the most difficult to set down on paper. Mr. Shaw is chief engineer of the Allen Cone Company of El Paso, Texas, and gave a highly illuminating talk on the various methods of hydraulic separation of pit and quarry materials. The members showed great interest in the topic and a large part of the information given by Mr. Shaw was in answer to the questions of producers.

John Prince

The report of John Prince of Kansas City, treasurer of the association, showed an expenditure during the year of about $35,000 as against a budget estimated at $50,000 at the beginning of the year. Mr. Prince was reelected.

Other Officers

George J. Nattkemper of Terre Haute, Ind., was reelected vice-president, and the new executive committee consists of the following:

V. O. Johnston, Lincoln Sand and Gravel Co., Lincoln, Ill.

Hugh Haddow, Jr., Meantico Sand and Gravel Co., Millville, N. J.

A. P. Burke, Atlanta Sand and Supply Co., Atlanta, Ga.

C. L. Ruffin, Massaponas Sand and Gravel Co., Fredericksburg, Va.

Michigan Talks Rates

Annual Meeting of Producers Followed by Hearing Before State Commission

When the meeting of the Michigan Sand & Gravel Producer's Association was called to order on February 16 at the Dunley Hotel in Lansing, all but three of the members were present, and one of these voted by proxy.

Mr. R. C. Yeoman, Extension Engineer of the Indiana Sand and Gravel Producer's Association and Mr. J. D. Pierce, Executive Secretary of the Illinois Concrete Aggregate Association were visiting gravel men. Mr. A. E. Sheltraw was also a visitor at the meeting.

After the approval of the minutes of the preceding meeting and of the report of the Secretary-Treasurer, the President appointed as a nomination committee: Mr. H. W. Allswede, Mr. M. P. Huyck and Mr. John Caldwell.

President Denton then introduced Mr. R. C. Yeoman, Extension Engineer of the Indiana Sand and Gravel Producers' Association. Mr. Yeoman gave a talk on organization, telling how successful the Indiana Association had been in the past years, explaining in detail the point to which they carried co-operation and brought out the fact that their association assessed its members much heavier than the Michigan Association. He stated further that each and every member advised at their last annual meeting that they felt the money which they paid into the Association had been returned tenfold. Mr. Yeoman also dwelt at length on the necessity of a well screened, washed and graded material and the use of this material in all forms of concrete work, going into detail on the efforts made by the Indiana producers to see that their material met the specifications. He said in conclusion that all members of the Michigan Association whether present or not should continue to back up the officers of their Association and assist in every way when caled upon, whether morally, financially or otherwise.

The President then introduced Mr. Bradley of the Ohio-Michigan Sand and Gravel Co., who spoke briefly of the National Convention recently held in New Orleans and dwelt at some length on the importance of the National Association. Mr. Bradley was the first commercial producer of sand and gravel in Michigan and he related many interesting facts as to the progress of the industry since he first established his plant many years ago.

Mr. Denton then introduced the Executive Secretary, Mr. G. J. Bolender. Mr. Bolender reviewed the activities of the Association, particularly in connection with the present rate case in Michigan and the case recently held in Washington, giving an outline of what the nature of the testimony would be and asking for specific information from various producers which was to be used at the hearing. He also went into detail as to the measure of the relief which would be asked for.

He called special attention to the action of the members of the Association in Lansing on January 11th, when he was instructed to take no action with reference to the two and three line haul rates and further asked if an expression could be had from the Association alleging a reduction in prices equal in percentage to the proposed reduction in freight rates. He announced to the Association that in this litigation he was authorized to act on behalf of the Governor of Michigan and the State Highway Department and he would be assisted in the presentation of the case by the Attorney General of Michigan.

The recommendation of the Nominating Committee was as follows: President, L. E. Denton, Vice Pres. W. F. Fisher, Secretary-treasurer, P. D. Hoel, Executive Committee: Mr. W. F. Bradley, Mr. H. N. Battjes, Mr. W. H. Allswede, Mr. R. H. Pardee.

The following resolution was carried:

RESOLVED: That the members of the Michigan Sand and Gravel Producers' Association challenge the railroads to lower the freight rates and therefore, the cost to the consumer, by the same percentage below the peak charges (August 26, 1920) that the producers have lowered their prices from the peak prices reached in 1920 and 1921.

Oral instructions of January 11th., to the Executive secretary, relative to the two and three line freight rates were rescinded, thereby authorizing the Executive Secretary to proceed in his own way to handle this case.

The Auditing Committee complimented the Secretary-treasurer on the

condition of the Association's books and the business like way in which they were kept, stating that it was an easy matter to make the audit.

All the producers stayed over for the hearing, which opened on February 17, at 10 o'clock, as scheduled.

Mr. Matthews, of the P. C. C. & St. L. R. R., was the first witness called by the Commission to testify on the general rate situation. He was not officially associated with any Michigan line. The gist of his testimony was that he had changed his mind since the Ohio case, from opposing the mileage scale to a very emphatic support of the same for sand, gravel and stone. He was very firm in the belief also that the scale should be applied rigidly.

Mr. E. B. Tullis, of the B. & O., testified in a similar way for the Commission, on the rate scale proposed at the National sand and gravel hearing at Washington. The scale he proposed was as follows:

1	to	20	miles	—	$0.70
21	"	40	"	—	0.85
41	"	60	"	—	1.00
61	"	80	"	—	1.10
81	"	100	"	—	1.20
101	"	125	"	—	1.30
126	"	150	"	—	1.40
151	"	175	"	—	1.45
176	"	200	"	—	1.50
201	"	230	"	—	1.55
231	"	260	"	—	1.60
261	"	300	"	—	1.65
301	"	350	"	—	1.70
351	"	400	"	—	1.75

The purpose of this scale was two-fold—(1) to produce the same revenue that they were receiving at the time of the proposal; and (2) to remove the chaotic condition of the rates in C. F. A. territory. Mr. Tullis did not agree with Mr. Matthews that the scale should be applied rigidly.

Mr. Bolender brought on witnesses to show that the order of the Michigan Utilities Commission had not been carried out in a number of instances, and also to show the effect of the competition of slag, which in many cases is carried at a less rate per ton.

Mr. Bolender said the producers, state officials, county road commissions, and others vitally interested in highway and other public work, ask that the entire original 40 per cent increase in these rates, made in 1920, be removed, and then 10 cents a ton deducted from those rates. This would make the Detroit zone rate 50 cents instead of the present one of 70 cents, and reduce other zone rates accordingly.

"With reduced rates the state and counties can build far more roads for the same money, or the same length of roads for less money," he declared. "It would save the taxpayers of this state from $2,500,000 to $3,000,000 a year."

Prior to the hearing, representatives of the producers had gone over the matter with Governor Groesbeck, who in the interest of the public and the 1922 state highway program assured them his unqualified support in their demands for the lower rates.

It was pointed out at the hearings Friday that Ohio has recently lowered such rates 28½ per cent, while the utilities commission's order of May, 1921, lowered the Michigan rates only about 10 per cent.

Engineers from the state highway department, county engineers, and the attorney general's department were present at Friday's hearing in support of this movement for the lower freight rates.

In answer to the claim of the railroads made before the interstate commerce commission that the 10 per cent decrease made last year in Michigan caused a loss of $10,000,000 to Michigan lines, Mr. Bolender produced some statistics to show that since that 10 per cent decrease in this state sand and gravel shipments had increased 20 per cent, while in states where the rates maintained such shipments declined 20 per cent.

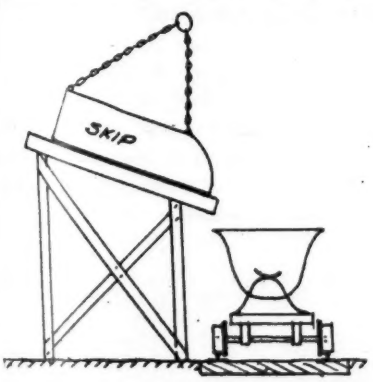
He also maintained that at 50 cents a ton for the Detroit zone rate the railroads should make a fair return. It was also claimed that the earnings per car mile in freight rates on sand and gravel in Michigan are double the actual earnings on all other commodities.

Other things urged before the commission were: That before the 10 per cent reduction of May, 1920, the peak increase in sand and gravel rates was 185 per cent as compared with an average of 111 per cent on all other commodities; that labor, and materials, including sand and gravel, have greatly declined in price and freight rates should come down accordingly; and that the lower rates now asked are identically the same as those originally asked in the petition of the sand and gravel producers filed with the state commission in Dec., 1920.

Unloading Derrick Skips

ONE objection to the use of derrick skips in loading cars and trucks is that the heavy skip gets to swinging as it is carried around by the derrick; and before its load is dumped into a car or truck, the skip is likely to hit the vehicle several times. This means injury to both the body of the vehicle and the skip, so that each quickly becomes so battered that they must either be repaired or replaced. This has caused some users of derricks to discontinue their use in quarries.

This objection can be overcome at small cost by the use of a platform or stand as shown in the accompanying sketch. Here an easily constructed



Stand for Unloading Skip into Car or Truck

stand is built of heavy timbers, and placed at the loading point for cars or trucks under the boom of the derrick.

The skip is loaded either by a machine or by hand and swings around by the derrick to this platform, being landed on it as shown. The front chains are unhooked and the back chain remains fastened. The derrick then starts off raising the back of the skip, dumping its load into the vehicle. The skip once emptied is swung around and placed on the ground to be reloaded.

By this method the skip does not touch the body of the vehicle, nor is it injured itself, for it lands on its flat bottom on a timber surface.

Care must be exercised to see that all the stones slide out of the skip, for if any are left in it, they are likely to fall out, and hitting a man kill him. Many men have been killed in quarries by rocks falling from skips that were supposed to be empty. The man in charge of the vehicle should see that all the stones are out of the skip.

The top of the stand should be built larger in area than the bottom of the skip, so that it will be easy for the operator of the derrick to land the skip upon the platform.

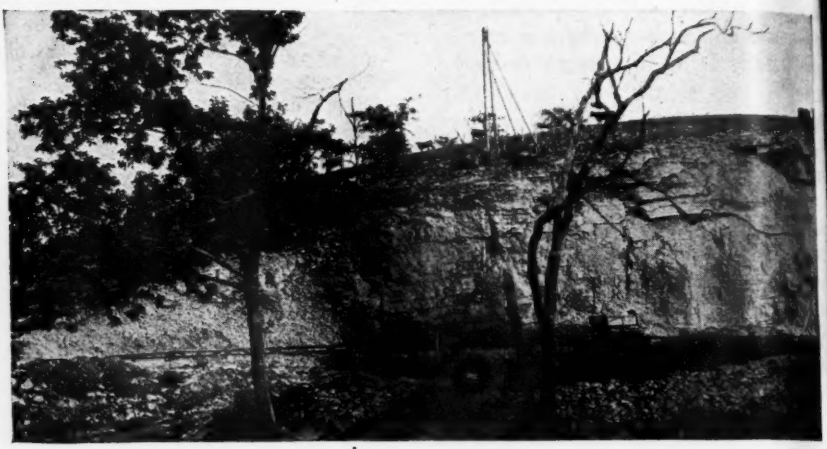
As the derrick has to be moved to a new site, the stand can be moved by means of the derrick.

This is a better method than having a bin into which skips can be dumped, and then load vehicles from the bin. But if it is necessary to have some storage from which to load vehicles, then a bin is needed, and a dumping platform can be built on the side of the bin.

New Gas Engine Agency

The Rathbun Jones Engineering Company, Toledo, Ohio, has appointed the Ingersoll-Rand Company, New York, general sales agent for Rathbun gas engines. The large sales organization and service department of the Ingersoll-Rand Company, combined with the fact that gas engines are used to drive compressors, pumps, and other machinery which it manufactures, places it in a position to serve better the users of gas engines and other machinery.

Rathbun gas engines are well-known to the trade as they have been in successful operation for over twenty years. They are of the vertical, multi-cylinder type and are built to operate on natural, illuminating, producer, coke oven, oil still and other forms of gases which can be successfully handled in an internal combustion engine. Sizes range from 100 brake horse power to 1,450 brake horse power.



Quarry Face of Bromide Crushed Rock Co., Bromide, Okla.

Working Long Face

Oklahoma Quarry Under New Management

THE Bromide Crushed Rock Company, has been operating since last April at Bromide, Oklahoma. The plant was formerly under the management of the Viola Crushed Rock Company.

The face of this quarry is 1,100 feet long and 75 feet high. There is hardly any overburden; the solid rock runs from top to bottom.

Tests made at various times have shown that the material runs over 90 per cent pure lime. It also shows a high French coefficient test. A large amount of it is being used in Government roads, four separate pieces of work being supplied at the present time. A considerable quantity of fine dust is being sold for agricultural purposes.

Two Armstrong & Ferguson blast hole drills are kept at the face at all times, preparing for the periodical shooting down of material. The stone, after it is shot down from the face, is loaded by a steam shovel into dump

Crushing Plant of Bromide Crushed Rock Co.

cars which are drawn by mules to the crusher. The crushing equipment consists of two No. 5 Austin crushers and one No. 3 Austin crusher. Power is furnished by a 100 h.p. oil engine operating a line from which the crushers and screens are run.

The plant is under the supervision of Mr. Earl Legg, superintendent. The president of the company is Mr. A. F. Hause, and the vice-president is Mr. J. M. Murray. The offices of the company are located close by the plant at Bromide, Oklahoma.

Engine Hints

In the August issue of PIT AND QUARRY was published twenty-two hints for operating boilers to make them more efficient and safer. Boilers are only half of a power plant, the other half being the engine. Although the efficiency of a steam power plant starts with the boiler, yet the entire plant cannot give efficient results without the engine being operated in the best manner possible. For that reason the following engine hints are given:

1. Lubrication is the first essential in running an engine.

2. Use only good lubricants. A cylinder oil for the inside of cylinders, a valve oil for ordinary lubrication, and a cup grease for pressure cups.

3. See that the lubricators, oil cups and pressure cups are all set so that they will feed the lubricant into the proper place.

4. It is better to have a little too much oil than not enough.

5. Excell oils can generally be caught in drip pans or buckets hung on the machinery or placed below it. These can be used over for some purposes.

6. There are many oiling devices on the market. It is cheaper to buy some of these and use them than to pay for new bearings.

7. Keep oilers and grease pots handy as a temporary supply may be needed at any time.

8. Have regular hours for filling all oil cups and lubricators. These hours can be marked down on a sheet of paper and tacked up in the engine room.

9. Open the globe valve to start engine slowly. As the engine warms up, give it the full head of steam.

10. Before starting engine see that cylinder cocks are open, especially if engine has been standing dead for some time. Failure to open these cocks may result in a loose piston or knocking out the cylinder head. After the engine is warmed up, close these cocks.

11. In cold weather, when stopping the engine at night, open all cocks and drain the lubricator, otherwise water will freeze, injuring the engine.

12. In stopping the engine, close the valve rapidly, especially in case of an accident. A cut off valve is excellent for this. Thus the steam line should be equipped with both a cut off and a globe valve. The last named can be used for starting the engine, the first named for stopping it.

13. Keep all bolts and nuts tight. Use wrenches provided for that purpose. Solid and S wrenches are better for this purpose than monkey wrenches. Stilson wrenches are not meant for use on anything unless they are round.

14. Steam baking from cylinders, valves etc., mean a waste of fuel, and an unnecessary wear on some parts of the engine. All leaks should be stopped by either tightening parts or using new packing.

15. Packing will not last forever. It should be renewed as soon as leaks occur.

16. Engines should be kept clean. This is done by using waste. All parts that are not supposed to be bright steel, should be kept painted.

17. Do not alter or adjust the piston head or valve stems on an engine. Before leaving the shop of the manufacturer these are all adjusted by an expert to give the greatest possible efficiency and they are not likely to need adjustment.

18. Watch out for knocks in your engines. When they occur, something needs adjusting.

19. Keep guards around gears, fly wheels and belts to prevent accidents.

William C. Sargent, for twenty-two years secretary and also a director of Chain Belt Company, Milwaukee, died suddenly on February 5th as a result of heart failure. He was seventy-three years of age and had been in ill health for several years.

Caustic Magnesia Tests

Investigating Its Properties with Relation to Sorel Cement

THE co-operative work of the United States Bureau of Mines with the Northwest Magnesite Co., on the technology of caustic magnesia, has been completed at the Pacific Experiment Station, Berkeley, Cal. Caustic magnesia is used for the manufacture of Sorel cement, or oxychloride cement, which is extensively employed for interior finishing, such as stucco and flooring. The properties of this cement, particularly in relation to the process of the manufacture of caustic magnesia, are not well understood, and thorough development of the technology might considerably extend the use of this cement.

The work already done by the Bureau of Mines has permitted for the first time the correlating conditions under which caustic magnesia is produced with the properties exhibited by the cement. The chief results of this investigation may be summarized as follows:

High-grade caustic magnesia can be made from certain varieties of magnesite hitherto considered unsuitable for the purpose.

Test runs with a modern type of mechanical furnace indicate that such a furnace can be used commercially for calcining magnesite to produce caustic magnesia.

Comprehensive tests have been developed for determining the properties of caustic magnesia as regards oxychloride cement manufacture.

Standard specifications for caustic magnesia have been developed in cooperation with manufacturers, producers, and users of caustic magnesia.

Fundamental data on the rate of decomposition of various kinds of magnesite have been obtained.

Other problems studied in connection with these tests included the effect of time and temperature of burning, effect of storage and exposure to air, and effect of free line on the properties of the product, as well as the effect of silica on the burning behavior of the magnesite.

The first part of the dolomite investigation at the Ceramic Experiment Station of the Bureau of Mines at Columbus, Ohio, has been completed and a report written.

As the price of one ton of dead-burned magnesite delivered to points in Pennsylvania is at present equal to that of thirty-seven to thirty-nine tons of raw dolomite, experiments were made in dead-burning Ohio dolomite for use as a substitute for magnesite refractories. Various fluxes, such as kaolin, flue dust, iron ore, roll scale, basic open-hearth slag, and blast-furnace slag were added, and the mixtures were calcined at a high temperature. Kaolin gave the best results, and specimens are still sound after storage in air for two years. Flue dust and iron ore gave fair results. The other mixtures disintegrated, by slaking and dusting, in less than two years.

Various methods for making dolomite brick were tested, and brick were made that have withstood storage in air for six months.

Unlike dolomite, magnesite can easily be placed in a "dead-burned" condition. As the price of dolomite is low compared with magnesite, concentration of magnesia in dolomite by reducing the lime content was investigated. Various processes already patented, as well as new processes that were developed in the laboratory as the work progressed, were investigated. By leaching and screening treatment a product was obtained with about 80 per cent MgO which is superior in MgO content to Canadian magnesite.

Experiments were made with magnesium, aluminum, iron, and manganese solutions to determine whether the slaking effect of calcined dolomite could be overcome by saturating calcined brick in concentrated sulphate solutions, thus changing the unstable lime to the more stable calcium sulphate. Magnesium sulphate, which gave the best results, caused the brick to become extremely hard.

The use of dolomite as a substitute for magnesite for oxychloride cements was investigated. Free lime in dolomite calmined above 800° causes excessive shrinkage and cracking of the finished cement. Cement with practically no free lime may be made by calcining the dolomite to a low temperature (600°C.) thus decomposing the magnesium carbonate but not the calcium carbonate.

Dolomite was calcined at a high temperature (1,000°) and suitable agents were added to react with the free lime. By this method the troublesome effects of lime are overcome and its cementing properties can be used to advantage. Two cements were made, one by adding kaolin, calcined at 750°, to dolomite calcined at 1,000°; the lime and calcined kaolin combining to form a pozzuolana cement. The second cement was prepared by adding enough magnesium sulphate to milk of dolomite to react with the lime, and by calcining the resultant mixture at 1,000°, the calcium sulphate being thereby converted into Estrich plaster. By adding enough magnesium chloride to react with the magnesia present, a cement composed of Estrich plaster and magnesium oxychloride cement was obtained, which becomes extremely hard, but is not as resistant to water as the clay-dolomite cements.

The Olive Hill Limestone Co., Olive Hill, Ky., increased its capital from $60,000 to $120,000.

Blasting in Winter

Today practically all quarries do blasting all the year round—in winter as well as in summer.

When ordinary dynamite is used cold weather blasting presents many difficulties which are not found in blasting in the summer time. There is the problem of "keeping" the dynamite, of thawing it, of rushing the task of loading the cartridges so that they will not become affected by the cold.

These problems can best be appreciated by the veteran blaster who knows by experience what precautions need to be taken to secure satisfactory results from blasting when the temperature is hovering around zero. Thawing may be a very dangerous process when it is done contrary to the methods recommended by the U. S. Bureau of Mines and the explosives manufacturers.

We have heard of blasters setting the sticks on end in front of an open fire, and placing the sticks in warm water, or under hot stones or boilers. Cold weather blasting with ordinary dynamite is not relished by quarrymen on account of the danger, the inconvenience, and the expense attached.

Up until about a year ago, only the large quarries did blasting in the winter time. Today the smaller plants also blast their rock whenever they want to, whether the weather be below freezing or above the summer heat, and they are doing it without encountering any difficulty. The answer is a new explosive that was put on the market last year. One of its chief qualifications is that it cannot freeze regardless of the temperature to which it is exposed. For this reason it is named, "Atlas Non-Freezing." Its use eliminates thawing. It is always ready for the shot and insures perfect detonation. There are other qualifications which have been attested to by the men in both large and small quarry plants. The handling of this non-freezing explosive does not cause headaches which usually are experienced when ordinary dynamite is used. It has been found also that the disruptive force of the explosive is greater than in other kinds of dynamite.

P. L. S.

In Cement Districts

Mills Resuming Operations and Anticipating Good Year

Spring production is looming ahead in the Lehigh Valley cement district of Pennsylvania, and in anticipation of early call for material, a number of mills have resumed operations. Others are making ready for active manufacture and it will only be a matter of a few weeks before things are in pretty full blast in this vicinity.

Indications point to a big year in 1922, both in the matter of production and sales. Price levels are well-defined in the different important markets, and any further reductions of importance are doubtful until lower freight rates prevail. Labor costs have been reduced and with the plentiful supply of men in this section, operating conditions look very favorable. Incoming inquiries give signs of exceptional activity in housing and other construction, as well as road work, and the latter will absorb large quantities of material well into the fall season.

The severe winter weather early in February had the effect of not only setting back operations at some of the mills, but curtailing shipments far below a normal tonnage. The situation now shows considerable improvement and a good quota of freight cars are leaving Northampton, Coplay, Bath and other points for eastern and western destinations.

The Lehigh Portland Cement Co. has resumed operations at its Mill F, at Ormrod, and Mill D will also be placed in service at an early date. The company is shipping sizable quantities of material.

The Coplay Cement Co., Coplay, Pa., has commenced preliminary operations at its Mill C, and full production will be scheduled within a few weeks at the latest.

The different cement companies at Nazareth, Pa., are maintaining capacity operations, with a number of the mills working both day and night shifts. There is a keen desire to replenish stocks, so long depleted, now that the spring season is at hand, and a large part of current manufacture is being placed in the storehouses. The different companies operating in this district include the Nazareth Cement Co., the Dexter Portland Cement Co., the Hercules Cement Co., and the Phoenix Portland Cement Co., now collectively giving employment to more than 2,500 operatives.

The Giant Portland Cement Co., Philadelphia, Pa., with plant at Egypt in the Lehigh Valley section, reports a balance of $43,123 for 1921 business, after the payment of a 4 per cent dividend on the preferred stock.

The Bath Portland Cement Co., Finance Building, Philadelphia, operating a large mill at Bath, Pa., is taking bids for the erection of a new plant at Sandts Eddy, near Easton, Northampton County. The company purchased a tract of fine property at this place some time ago, richly underlaid with cement rock, and had plans prepared for the mill. Estimates of cost, however, at that time exceeded $2,000,000, and the project, accordingly, was held in abeyance. It is expected that the plant, as designed, can now be built for $1,750,000, complete, and on this basis, the work will proceed at once. The plant will be equipped for electric operation in all departments and will duplicate to a large extent the present mill at Bath. It will have a capacity of about 4,000 barrels a day. The company has also arranged an appropriation of $300,000, for improvements in the Bath plant, and a large part of the fund will be used for the complete electrification of the mill, now about 30 per cent completed. A power plant will be constructed, with installation of a 4,000-horsepower turbo-generator. The capacity of the mill, at the same time, will be increased to about 4,000 barrels daily. At a recent annual meeting, the following officers were elected: Louis Rafetto, president; Fred B Franks, first vice-president; Walter Dutton, second vice-president; Herbert Rafetto, third vice-president; F. P. Hahneman, Philadelphia, secretary; and John Barnes, treasurer.

George G. Sykes, Allentown, Pa., secretary of the Lehigh Portland Cement Co., died at his residence, 1306 Hamilton Street, January 24, of a chronic heart affection. He became connected with the company in 1899, and closely following was elected secretary, holding the position continuously until his death. He is survived by his widow.

At the annual meeting of the Alpha Portland Cement Co., held at Easton, Pa., January 29, the following officers were elected for the ensuing year: G. S. Brown, president; Frank G. McKelvy, F. M. Coogan and C. A. Irvin, vice-presidents; John J. Matthes, treasurer; F. G. Lyons, assistant treasurer; R. S. Gerstall, secretary; and W.

E. Viets, Chicago, Ill., assistant secretary and assistant treasurer.

The Patton Cement Plaster Co., Rotan, Tex., has broken ground for the erection of its prosposed new cement mill on site near Rotan. The plant will consist of a number of buildings and is estimated to cost about $200,000, including machinery. The Katy Railroad has constructed a branch line to the property. The company was organized recently with a capital of $350,000, and is headed by J. W. Patton, president; and E. W. Maben, secretary.

The Louisville Cement Co., Louisville, Ky., has filed notice of increase in capital from $850,000 to $2,100,000, for proposed expansion. The company operates plants at Milltown and Sellersburg, Ind.

Wants Highway Money

Kentucky Trying to Get Big Appropriation Through Legislature

By Our Louisville Correspondent

The interest of the trade here of late has been centered on efforts to get a fifty million dollar road bond through the state legislature now in session, and to get some relief from high freight rates which are a serious check on commercial quarry work and on the distribution of sand and gravel.

There has been a hard drive on to get the present legislature to pass a bill submitting to the public at the 1922 election the question of issuing fifty million dollars worth of bonds for road building. Incidentally discussion of this bill at Frankfort led to a fistic encounter between a member of the state highway commission and the president of the Kentucky Motor Club.

Entirely aside from what may or may not develop out of the bond issue proposition the state has been making good progress in road building and the indications are that the spring and summer will bring busy times both in road and street work as well as a good local trade in building operations.

The State Highway Department made a report recently which showed that from July 1920 to January 1922 practically a thousand miles of new roads have been built and half that number in addition has been maintained at a total cost of $7,894,419.30. Most of this work according to the report was on Federal Aid Highways built according to government specifications and with types of surfacing meeting the requirements of the Bureau of Federal Highways.

High freight rates are a great hindering influence both to the movement of road material and to the progress of commercial quarrying. Many contractors have been brought to believe that the setting up of portable quarry and crushing plants in the closest possible contact with road undertakings will result in cheaper aggregates. This has seriously curtailed the work of established quarries. The State Highway Commission and the Kentucky Highway Contractors Association are both seeking earnestly for some ways and means to get lower freight rates either through the State Commission or through Federal Action.

R. B. Tyler, who just returned a few days ago from his vacation trip in the gulf coast country, says he had a good rest and a splendid time and is now rolling up his sleeves and getting to work again. So far he says there is nothing very encouraging in the prospects for better freight rates and until they get this commercial quarrying will be seriously handicapped. Under the circumstances he is naturally centering most of his attention on his road contract work and the quarrying operations in connection with these which will be the first of the spring development.

The local sand and gravel people are going through their dull season now but they are looking forward hopefully to busy times which should start as soon as the weather conditions are favorable. Not only are there good prospects for local building but there is quite a lot of street improvement being let and this promises to start early wit ha good demand for sand and gravel.

The local trade outlook in building and street work together with road building and the promised demand for material from dealers throughout the state makes it look like we are to have a busy year in the sand and gravel business and that it will start off early and keep going.

The Southern Sand & Gravel Co., of Shelby County, Tenn., has filed an amendment to its charter seeking to change its name to the Central Sand & Gravel Company.

The Wabee Gravel Company, Milford, Ind., increased its capital stock from $50,000 to $100,000.

Arguments Presented

Sand and Gravel Producers Filed Their Brief Before Commission Feb. 7

By our Washington Correspondent

Following hearings of representatives of the sand and gravel industry before Examiner Hosmer of the Interstate Commerce Commission on January 16, 17 and 18, the National Association of Sand and Gravel Producers has filed a brief with the commission covering the argument which it wishes to make for lower freight rates on commodities produced by the association. The brief was filed on February 7, and is one of a series of four complaints filed by the association attacking the high level of freight rates for transportation of those materials.

When this complaint was filed, it was so drawn as to enable the complainants to treat in detail each and every rate on sand and gravel in the so-called Central States, as described in the petition, for the purpose of obtaining adjudication of the unreasonableness and impropriety for the future of every individual rate from every producing point in those states to each destination within a reasonable radius therefrom. But since the complaint was filed, October 15, 1921, there have been certain important changes in the railroad situation and there has developed a crisis which has brought about the general rate inquiry, now pending before the Commission. It therefore developed that it would not be practicable or possible for the witnesses for this association to present this case along the lines of a detailed rate case involving severally all of the rates in this territory, the brief adds. The complainants therefore concluded some weeks before the hearings to present the case along different and broader lines than originally intended. In other words, this case is now to be considered from the broad economic and transportation aspect rather than with respect to any detailed examination of the reasonableness, propriety and effect of each and every rate herein involved.

"We submit that the outstanding question in this case is whether the Commission will go to the root of the matter, and, in the interest of maintaining railroad revenues, enter its order reducing the rates to a point where the tonnage will move and construction work be resumed in full volume," says the brief.

Taking up specific rates on various classes of materials the brief says:

"Gravel competes directly with slag and slag competes directly with gravel as coarse aggregate in concrete construction. The slag has a very much lower freight rate from the same distances than has gravel. This is a situation which in all of our conferences with the railroads, and upon direct and insistent questions asked them, we have never found anyone who could defend. The effect of this lower rate on slag has been to allow the slag industry to take the business away from the gravel producers. The development of the slag business, fostered by a preferential rate, has been that we have lost that amount of business measured by the production of slag. Commercial slag is somewhat lighter per unit of bulk than gravel. The materials are sold by the ton, not by the yard. Under an equal rate per ton, as gravel weighs more to the yard than slag, the transportation charge is more per cubic yard on gravel than on slag.

"Sand and gravel are raw materials produced from rivers and banks through the territory. Deposits are numerous and operations usually are located with regard to the demand. The value of sand and gravel is very low; and the price f. o. b. cars at origin is usually less than the freight charges even for the minimum hauls of the material. Sand and gravel move in the cheapest kind of equipment, any ordinary open top car being used for the transportation. The cars are sent in at the plants in strings for loading; are loaded promptly and there is little, if any, car detention. The producers frequently have to repair the cars so that they will hold the materials; but the transportation of these materials does not damage equipment. Sand and gravel are indestructible commodities. They are not subject to damage by fire or water or rough handling, and the loss is only partial in case of wreck. Sand and gravel move in great volume from established shipping points. This appears not only from the evidence of complainants' witnesses, but also from the tonnage statements filed by the defendants. The movement is particularly heavy in the summer and early fall when there is not the maximum demand for open top cars. The average loading of sand and gravel per car is over 50 tons."

The brief carries tables showing the

old rates in comparison to the new and goes into figures extensively for the benefit of the commission, adding:

"It will be observed that the total increases per ton have ranged from 43 cents to 96 cents above the rates that were in effect at the beginning of Federal control, although the rates themselves as of that time were in each case less than $1. As the consumer pays the freight, generally speaking, the tables show that materials cost the consumer from $21.50 to $48.50 per car more on account of the freight charges under existing rates than under the rates in force at the beginning of Federal control and it will be recalled that the value of these materials f. o. b. the plant is substantially less than $40 per car on the average throughout the United States as shown by government figures."

Taking up arguments made by the carriers for a maintenance of rates the brief says:

"We are indebted to the defendants for a very striking showing that can be drawn from one of their exhibits. The exhibit certainly shows excessive earnings on sand and gravel business as the traffic actually moves. The per car and per car mile earnings used are based on an average loading of 52.97 tons determined from the 29,204 cars shown on that exhibit, the total weight of which was 1,547,114 tons. The exhibit on which it is founded, shows that 66 per cent of the business in this territory is for hauls of 50 miles or less, and 87 per cent of the traffic is for hauls of 75 miles or less. We particularly direct attention to the enormous earnings per car mile under existing rates shown in the exhibit."

After citing numerous instances where the sand and gravel industry has been hurt by the present rate levels and where, as a result, the carriers have suffered a loss of business, the brief says:

"The present rates involved in this case are rates that have borne enormous increases since January 1, 1910, the advances made on June 25, 1918, being substantially double the advances to which almost all of the freight traffic throughout the United States was subjected. That is to say, under the so-called '25 per cent advance,' sand and gravel received an increase which actually averaged about 50 per cent. This, despite the fact that the material from which gravel receives its more severe competition in this territory, namely, slag, was subjected to an advance of only 25 per cent, or substantially less than 20 cents per ton, the amount superimposed on gravel.

"It will be remembered that the burden of proof is upon the defendants to justify the reasonableness of the present increased rates on sand and gravel. The defendants did not sustain this burden and conducted their evidence as though the burden were upon complainants. The complainants offered substantial evidence of the unreasonableness of the rates. The respondents certainly have not sustained by their evidence in this case the burden of proof resting upon them. They have attempted no justification of the high earnings produced by their present high rates on these materials.

"Putting wholly to one side the economic aspects of this case, treating the issues strictly and technically, the proof seems to the complainants conclusive that the present rates on sand and gravel in this territory are not just and reasonable rates for the transportation services involved, but are excessive; and second, that as compared with the rates on slag between points where there is an actual and substantial movement of those materials, there is proved to be an unjust discrimination. The proof that the rates are unjust, unreasonable and excessive, rests upon a number of features, and in weighing this proof, it is to be remembered that the burden is upon the defendants so that any insufficiency in any feature of the record ought to be resolved against the defendants. Historically, the rates on sand and gravel involved herein have been subject to a much greater measure of advances since the beginning of Federal control than apply on all other materials and this despite the fact that these materials were least able to stand increases in rates.

"The rates on these materials as now in force, yield to the defendants much greater revenues per unit of transportation service than the average of all of their traffic. These materials are of the lowest grade of any freight handled by the defendants and therefore should bear on the ad valorem basis and considering the cost of service, the lowest freight rates. The transportation of these materials is highly competitive and if the defendants are to continue to enjoy a substantial tonnage, they must meet this competition. This is a point put forward in this connection only because it is elemental that competition is con-

sidered as one of the factors in making and judging freight rates. No other commodity transported by the railroads is more highly competitive than this."

Looking to the economic features of the case, the brief says:

"We need only point out that the evidence fully sustains the averments of the complaint and demonstrates that this is the present situation in the Central States: Sand and gravel are important basic commodities used extensively in construction work of all kinds, and are the basis of all concrete construction. The larger plants with permanent equipment and machinery necessary for production of such materials in quantities and prepared to meet standards of specifications established by engineers and construction authorities, have to meet a considerable and active competition from roadside or portable plants which are now situated throughout the consuming territory and are rapidly increasing in number. The materials produced in these roadside plants are not prepared to meet standards or specifications, and therefore are inferior in quality and less suitable for the proper use for which they are intended than that produced in railroad shipping plants. But the use of inferior materials is being compelled by the high delivered costs of prepared products, including high transportation charges thereon.

"Despite this competitive situation, the established shipping industry has increased in importance in recent years due largely to increase of concrete construction and hard road building. The industry has developed in the Central States from one involving largely a short movement of sand and gravel by wagons locally to an important shipping industry. Sand, gravel and crushed stone contribute an enormous volume of tonnage for railroad transportation. A normal production and a large and steady output is necessary to stabilize the industry and keep down the cost of production to a point where the established plants which ship by railroads are able to supply the demand with their product in competition with local materials, and thus maintain the railroad tonnage of these materials.

"The present freight rates in Central States are a severe menace to the producers and the industry. The present freight rates are causing, and have caused, a more extended use of local materials produced on the job and transported from local pits by truck. The freight rates during the past year have resulted in eliminating many important markets and restricting the rail movement. The high freight rates have caused a lowering in standards and specifications. Under the present freight rates, a large tonnage of sand and gravel has been diverted from the railroads and replaced by materials transported by river or truck. The business of the industry has been disorganized; production has been curtailed and there has been a general inactivity in construction work. The plainest and quickest remedy for the present conditions of unemployment would be afforded by encouraging construction work. The cost of construction work must be brought down and therefore rates must be reduced.

"There remains for consideration only the question of the extent to which intrastate rates are involved and should be dealt with by the Commission in this proceeding. In the first place, it is to be remembered that the preponderance of the tonnage of these materials in the Central States is for intrastate movement. Primarily, the jurisdiction of this Commission is over interstate rates. But it has a secondary jurisdiction over intrastate rates and this authority is probably paramount to that of the State Commissions. During the past few months, there have been voluntary, although slight, reductions by the defendant in some of their interstate rates in this territory. There have been greater, and to some extent voluntary, reductions by the defendants in many of their intrastate rates on sand and gravel in these states. The intrastate rates are therefore to an important extent lower than the interstate rates for corresponding movements. The complainant in this case definitely assumes to speak, and is authorized to speak, for the interstate shippers of sand and gravel in this territory as well as for the intrastate shippers.

"A minor feature of this case is the question of minimum weights. Sand and gravel load well over 50 tons to the car on the average. In fact, the only question is, in the majority of cases, how many tons will the car safely carry? Some of the tariffs provide the marked carrying capacity of the car as the minimum weight. Under the operating rules the consignor is not permitted to load to more

than 10 per cent above marked capacity. It is impossible to gauge to a nicety the weight of the material being loaded into the cars, although the producers can and do estimate the weights fairly accurately. It is clearly unreasonable to subject a shipper to the unpleasant choice of incurring a penalty for overloading or paying a premium for underloading. The producers therefore request that the defendants be required to amend their minimum rules so as to afford a wider variance between the maximum load permitted in the car and the minimum load required for purposes of assessing revenues."

In conclusion, the brief says:

"The complainants respectfully request the Commission to direct the defendants to reduce their rates on sand and gravel throughout this territory from the present prohibitory basis to amounts not exceeding by more than 10 cents per ton, the rates that were in effect on June 24, 1918. In making this demand, the complainants are perfectly aware that during the past year from some plants and in some portions of this territory, there has been a good movement of these materials. But they are dealing with the future and not the past. The conditions of the immediate past have expired; and the present outlook is such as to make certain the prediction of ruin to the shipping sand and gravel industry if the present rate level stands; ruin to the industry means loss to the railroads of an enormous and high profitable tonnage. We, therefore, submit in closing that the mutual interest of the complaining industry and the defendant transportation systems, requires a modification of the existing rate level on these commodities in this territory. Moreover, the shipping season will soon open. There is an emergency reason therefore, requiring a prompt decision in this case."

The association has had a long and tiresome road to travel in its fight for lower rates. It probably will be about a year from last May, when the freight rate committee of the association met in Chicago and adopted plans for the fight, until the decision is rendered.

The association has just now reached the point in its fight of filing its briefs. After this must come the filing of the examiner's tentative report to the Commission, and then a twenty-day period for filing exceptions to this report. Exceptions may be taken, of course, by either side, if not satisfied with the report. Then announcement of the date for oral argument before the Commission will be made, and later the oral argument. The Commission will then take the case under advisement and later announce the decision. This decision may come some time during April or the early part of May.

Good Roads Machinery Co. Catalog

The Good Roads Machinery Company's new Catalogue No. 5A covers pretty thoroughly all the features of the service they are prepared to give the sand and gravel producers in the construction of re-modeling of plants of all capacities. The book begins with a number of tables of useful information for the sand and gravel producer, touches briefly on the work of aggregate production, and then begins a description of some of the principal pieces of equipment used around sand and gravel plants.

First is described the company's own flexible iron shaker screen, and the manner in which it is operated in connection with washing purposes; then, the sand settling tank or wash box, which is used to clean and de-water sand from which the larger gravel has already been eliminated; then, the Champion revolving screen is taken up and carefully described and illustrated, and shown at work in a number of plants. The Champion elevator, steel apron feature, steel rotary feature, special bar grizzly and dredging elevators are next considered. Considerable space is then devoted to dragline cableway excavators, and Champion jaw crushers, Climax jaw crushers, chutes and bin gates and gasoline and electric hoists. Then follow fifteen pages of drawings and photographs of various installations made by the Good Roads Machinery Company, where operations have been carried on very successfully.

The book should prove very interesting to sand and gravel producers, and will undoubtedly be the means of giving some new ideas on economical production. Copies of Catalogue No. 5A may be had by writing the Good Roads Machinery Company at Kennett Square, Pa.

The New England Lime Co., of Winsted, Conn., is replacing the buildings destroyed by fire several months ago.

For Active Production

Eastern Field Assuming Life in Expectation of Good Demand

By Our Eastern Correspondent

With the spring season near at hand, sand and gravel producers in New York and New Jersey are making ready for active production. The outlook is favorable and current inquiries for spring delivery are decidedly encouraging. With a strong tone to the general building material market, sand, gravel and crushed stone are maintaining prevailing price levels under fair immediate call, and construction interests in the residential line are prominent in the demand.

Road building operations in 1922 are destined to be an important factor in the consumption of gravel, crushed stone, sand, cement and kindred materials. In the eastern district, New York, New Jersey, Pennsylvania and Delaware have announced highway work of also staggering proportions and many millions of dollars will be directed to this line. In Philadelphia alone, more than $2,000,000 will be expended for repaving of city streets. Producers are looking forward to an unusually active demand within a few weeks to come.

The present distribution of materials in the New York territory is good, considering the season of the year, and both producers and material dealers are operating under increasing call. Prices remain quite uniform and there is marked stability in certain lines.

A variable decline of 5 cents per cubic yard for crushed stone in the New York wholesale market, has had the effect of little, if any change, for with a $1.75 figure as "rock bottom," the majority of sales are being made at $1.80 and $1.85 in cargo lots, f.o.b., city. A year ago, the material sold at from $1.90 to $2.00. The same price prevails for 1½ and ¾-inch sizes.

Gravel is selling for $1.75 a cubic yard in carload lots, both 1½ and ¾-inch material, as against a quotation of $3.00 at this same time a year ago. Dealers are making sales at $4.00 and $4.25, for delivery on the job.

Good grade sand is bringing $1.00 a cubic yard in the wholesale market, with supply yards maintaining a figure of $1.80, delivered. Clean, high grade white sand shows no change from a $5.00 retail level, prevailing for many months past.

Portland cement holds at $2.80 a barrel, delivered on the job, with cloth bag rebate of 10 cents each. Dealers are paying $2.00 a barrel in cargo lots, alongside dock. There is decided pressure on the market and a decline of 5 or 10 cents, in the weeks to come would not be surprising. At Jersey City, N. J., just across the river, contractors are paying $2.10 and $2.12 a barrel in carload shipments.

The dullness in the lime market has resulted in lower prices for practically all standard brands with the exception of New Milford material. Common lime, delivered, is selling at $3.75 a barrel in standard 300-pound containers as against a previous dealers' price of $4.40. Finishing lime, standard 300-pound barrel, is being retailed at $4.70. Hydrate common, in cloth, holds ot $22.50 a ton, while hydrate finishing lime, in paper, is priced at $24.00 a ton, delivered on the job. Local warehouse prices on lime are $16.80 a ton for finishing material, and $12.50 for common stock. Common lump lime is selling wholesale at $3.00 a barrel upwards to $3.48, and finishing material, from $3.70 to $3.98.

The New England market, Boston district, is selling crushed stone at $2.50 a ton, delivered from the dealers' yards. Sand, suitable for mortar, is priced at $1.75 a ton, and clean beach sand, at $4.00. Portland cement in this section is selling for $3.40 a barrel in cloth, and $3.20 in paper. Hydrate finishing lime in paper is $20.00 a ton, and hydrate common, $19.00, delivered on the job.

Contract has been let by the New England Lime Co., Danbury, Conn., to the Berlin Construction Co., Berlin, Conn., for the erection of new buildings at New Milford, Conn., to replace its plant at this point recently destroyed by fire, as announced in the last issue of PIT AND QUARRY. Three structures will be built at the present time, all one-story, with main building, 30x300 feet, and others, 40x200 feet, and 25x75 feet, respectively. The amount of fire loss approximated $200,000, including equipment, and the new plant is expected to cost a like amount. The company plans to construct a number of additions at a later date. C. E. Grinning is president.

The McCauliff Quarry Co., Fitchburg, Mass., has been organized with a nominal capital of $6,000, to operate rock quarries in this section. Benjamin F.

McCauliff, Fitchburg, is president; and Richard M. Lawton, Garden City, Long Island, N. Y., treasurer.

The Connecticut Sand & Gravel Co., 447 Washington Avenue, Bridegport, Conn., has been formed under state laws, to operate sand and gravel properties in this district. R. C. McNeil is president and treasurer; and Johnathan Grout, secretary.

The National Marble & Slate Corporation, 236 West Fifty-fifth Street, New York, has arranged for a stock issue of $49,000, for general expansion. A portion of the proceeds will be used for the establishment of a new plant, with machinery for cutting, shaping, polishing and kindred operations. John J. Burns is president, and James D. Corsa, secretary and treasurer.

The S. F. Clough Sand & Stone Co., Syracuse, N. Y., has been incorporated under state laws with a capital of $50,000, to operate sand, gravel, and stone properties. The incorporators are S. J., F. B. and E. M. Clough. The company is represented by Gannon, Spencer & Mitchell, attorneys, Syracuse.

Wilson K. Page, Olean, N. Y., for the past fifteen years connected with the Western New York & Pennsylvania Traction Co., has resigned to become associated with the Allegheny Sand & Gravel Co., Olean.

The Morgan Sand & Gravel Co., Brooklyn, N. Y., has been incorporated with a capital of $25,000, to operate a sand, gravel and crushed stone business. The company is headed by F. and W. Kopp, and W. B. Nallen, and is represented by Giffon & Hannon, 115 Broadway, New York.

Gramm, Price & Turner, Inc., Camden, N. J., has been incorporated with a capital of $15,000, to manufacture and deal in lime, and affiliated products. The company is represented by the Corporation Trust Co., 328 Market Street, Camden.

The Washington Slate Co., Second Street, Slatingon, Pa., manufacturer of slate roofing, etc., is planning for the early reopening of its plant, and will give employment to about 75 men for initial production. The company operates large quarry properties in this section

The National Limestone Co., Milroy, near Lewistown, Pa., is discontinuing operations at its local quarries, and does not expect to resume for a number of weeks to come. The plant gives employment to more than 100 operatives under normal conditions.

A peculiar legal action was decided against the Hummell Glass & Limestone Co., operating a sand works near Hummell, Pa., on Feb. 17. The case was brought by a farmer, alleging that one of his cows died as a result of drinking water containing sand from the company's property. The jury at Huntingdon, Pa., court rendered a decision of $200 damages in favor of the plaintiff.

Sand and gravel producers at Pittsburgh, Pa., continue active in the local market, and prices of material hold firm. Building sand, f.o.b. barge, at dock, is quoted at $1.60 a ton, while delivered material at the water front is selling for $2.00. Local dealers are asking from $2.50 to $3.00 a ton for sand delivered on the job. Washed gravel is bringing close to the same figures and any daily fluctuations are minor. Crushed stone, 1-inch size, is priced at $5.50 a ton at the local supply yards, delivered. Portland cement is selling for $3.00 a barrel, in cloth, delivered on the job, with 10-cent bag rebate.

The Keystone Sand & Supply Co., Pittsburgh, is concentrating operations in the Coraopolis section, and a digger is furnishing sizable quantities of material from this point. The towboat "Victory" of the company's fleet is doing active service between this district and Pittsburgh, hauling many barge loads of sand and gravel, and transporting empties to the digger. The Rodgers Sand Co., is active in the vicinity of Ambridge, and the towboat "Twilight" is in daily operation between this port and Pittsburgh, bringing in many loads of sand and gravel. The steamer "Margaret" is also in service, with tows of material. The J. K. Davison & Brother Sand Co. has been making boiler repairs to its towboat "National," and the vessel will soon be in operation again; the work has been carried out at the plant of the Pearson Mfg. Co., Northside. The Iron City Sand Co., has been plying an extensive trade with its towboat "P. M. Pfiel," during the past few weeks, and many barge loads of sand and gravel have been brought into the Pittsburgh market from Glen Osborne and vicinity; the towboat recently was given a thorough inspection. The company will soon resume operations with its boat "Iron City" which was tied up through January and February at the South Twenty-second Street landing, Monongahela River, primarily for boiler repairs.

Frank Farrington's Business Talks

No. 3—Is Your Ship Coming In?

We talk a good deal about a time when our ship shall come in, but we never stop to think that a ship cannot come in until it has been sent out.

Have you sent out any ship?

Have you made any plans, have you mapped out any voyage for a ship that might come back to you laden with a cargo?

A lot of folks spend much of their lives waiting for the coming of ships that have never sailed.

How about you?

Have you sent out any ship equipped to secure anywhere a cargo that shall be of value to you?

You may be in business and doing enough to make a living, and yet you may not be taking steps active enough to freight any incoming ships with cargoes that shall pay a big return or bring you wealth.

I am afraid that for most of us the idea of a ship coming in is nothing more than hoping for a bit of luck.

We hope that some unknown and even unexpected ship may dock at our wharf.

Even when we do have a definite idea of what ship we expect, it is apt to be a luck proposition.

We are counting on the death of someone whose heir we hope to become.

We are trusting that some piece of property we have long thought valueless may suddenly prove to be worth a lot of money.

It is all very well to sit and wait for luck to come our way, but waiting for luck is a mighty slow method of getting results.

The best way to have good luck is to make your own luck.

If you want a ship to come in, load a ship and send it out and then there will be some reason in looking for its return.

Load it and man it carefully and be careful in choosing its destination and in giving directions to the captain.

Whether or not you ever have a ship come in depends not upon ships in general, but upon YOUR ship and upon YOU—but mainly upon YOU.

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Barber-Greene Loader Handling Gravel for a Road Job in Palo Alto County, Iowa

A New Dynamite

A newly developed dynamite which, it is announced, will prove an important factor in reducing explosives costs in quarrying, road building, construction and other open work has just been perfected by the Du Pont Company.

The new "powder" is known as "Dumorite" and is made with a double base of modified nitroglycerin and guncotton. It cannot freeze and does not produce headache.

In putting "Dumorite" on the market, the Du Pont Company announces that the explosive will effect savings of one-third on the dollar. It is as powerful stick for stick, under ordinary conditions, as regular forty per cent dynamite, its economy consisting in the fact that each case contains approximately one-third more sticks.

"Dumorite" is a free-running explosive. It is stated to be quick and of great bulk strength. Before it was perfected, several hundred trial mixings were made up, all of which were carefully studied and analyzed by explosive experts. The final explosive was then subjected to every possible laboratory test. It was afterwards taken to the field where it was tried out in actual work under varying conditions as to temperature, rock and kind of work. The results proved the new explosive to be especially adaptable for open work in quarries, construction and agricultural fields, for blasting hard rock and hard ores where the ventilation is good and for use in bituminous coal mines where a permissible is not required and where a large production of lump coal is desired.

Build Portable Reciprocating Feeder

The Weller Manufacturing Company, Chicago, Ill., manufacturers of conveying machinery of all kinds has perfected a portable reciprocating feeder to take care of materials received in hopper bottom cars. This feeder eliminates the digging of pits and cars can be unloaded at a point most convenient to where the materials are required. This machine operates above the track and handles sand, stone, gravel, coal, ore, etc., saving the labor of several men. One man can easily handle the job of unloading and delivering the materials to any style of loader or elevator. It is mounted on roller bearings and can be easily slipped under the car. A motor or engine is mounted on platform, making it a complete unit. There are no complicated parts to get out of order. Blue prints showing construction will be sent on application.

Wealth in Stone Ledges

Missouri's Limestone Deposits Rich Source of Agricultural Lime.

Missouri contains unlimited quantities of high grade limestone that is well suited for the production of agricultural lime, according to H. H. Krusekopf of the Missouri College of Agriculture.

Missouri ranks fourth among all the states in the production of lime; and the use of agricultural lime is as yet in its infancy. It is only because of the newsness of the lime-grinding industry in this state that Missouri is shipping in large quantities of agricultural lime from other states. By reason of its vast limestone resources, Missouri could supply its own lime needs and those of all the adjoining states.

More than 40 Missouri counties have limestone deposits of such quality and in such accessible form that they are well suited to the manufacture of agricultural lime. It is the counties bordering the large rivers where the purer beds outcrop most extensively and where the quarries are most easily established. Every county bordering the Mississippi River from Marion on the north to Cape Girardeau on the south has thick formations of rather pure limestone. High grade limestone beds are also extensive in every county along the Missouri River from St. Louis to Cooper and Howard counties on the west. Platte, Clay and Jackson counties have deposits of sufficient thickness and purity to be used commercially.

The southwestern part of the state, including most of the territory between Boonville and Sedalia on the north, and Springfield and Carthage on the south and west, is underlaid by the Burlington limestone. From the standpoint of agricultural lime, this is probably the most important formation in the state. The greater part of it is exceptionally free from impurities, and its quarried ledges contain from 90 to 99 per cent calcium carbonate.

The Williams-Arvonia Corporation, Richmond, Va., has been incorporated with a capital of $25,000, to operate slate and other quarries. James T. Sloan is president, Richmond; and John R. Williams, Secretary.

Indiana Work Planned

Sand and Gravel Men Outline Ambitious Program for the Year.

The executive committee of the Indiana Sand and Gravel Producers Association met on February 10th and outlined a program for the year.

Among the activities planned are the compilation of a freight rate table, the preparation of an exhibit for the office, the extension of our testing work to include more field tests, a drive to increase the membership, a publicity program, cooperation with the Allied Motor Commerce, and a definite legislative program.

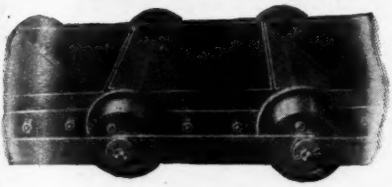
It was also decided to hold a midsummer meeting of the Association, and more frequent district meetings, the first of which will be one of Districts No. 2, 3, 4 and 5, to be held in Terre Haute some time in April.

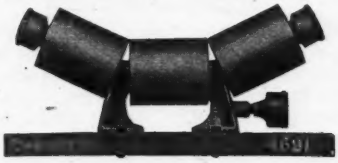
Type C Vibrating Screen

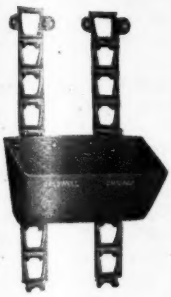
Something new in the way of vibrating screens is being produced by the Universal Vibrating Screen Company, of Racine, Wisconsin in the Type C. The claim of the manufacturers is that the ordinary sliding motion of material over the screen, which so greatly shortens the life of the device, is done away with in the Universal. It is claimed that operations are conducted without the annoyance of plugging up of the holes; that the tension of the screen cloth can be adjusted in a few seconds while the machine is in operation thus avoiding the slowing up of production; that the Type C screen using a screen cloth of 2 to 8 mesh will perfectly screen from 25 to 40 cu. yds. of material per hour. Another strong feature of this type of screen is that it is operated from a ½ h.p. motor, which brings the power cost down to less than 2 cents per hour. Screens can be furnished with or without motors.

Literature may be secured by writing the Universal Vibrating Screen Company, 1528 Owen Avenue, Racine, Wisconsin.

The Wabee Gravel Company, Milford, has filed papers with the secretary of state showing an increase in its capital stock from $50,000 to $100,000.







CONVEYOR ACCESSORIES

Insure the continuous working of your Elevating, Conveying and Power Transmission Machinery, by keeping spare parts constantly on hand.

Be prepared for increased business by having all your equipment up to its most efficient working order.

Replace that bucket or chain now—make that extension to your plant that you have been thinking about—now!

H. W. CALDWELL & SON CO.

LINK-BELT COMPANY, OWNER

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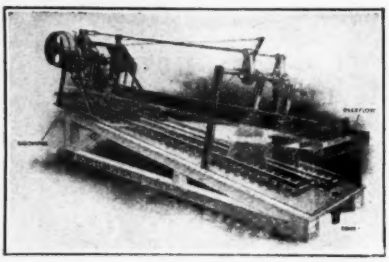
CALDWELL

Dorr Classifiers

Sand and gravel producers are showing an increasing interest in the work of the Door Company, of New York and Denver, in sizing, washing, and dewatering sands. This engineering company is recognized as an authority on wet classification in the metallurgical field, where its mechanical classifier has almost entirely replaced cones, settling boxes, and other similar devices for classification and sand washing in milling operations.

The same advantages which have made Dorr classifiers so universally accepted by the metallurgist are their strongest recommendation to the sand and gravel man, with exactly the same physical problem to solve.



The installation of Dorr classifiers has always resulted in:

1. The continuous production of clean and uniform sand.

2. Lowered costs due to the elimination of operating labor.

This machine will automatically make a close separation at any point from 40 to 350 mesh. Separating at 100 mesh, for example, the machines will give sands 96 per cent plus 100 mesh and a slime overflow 98 per cent minus 100 mesh.

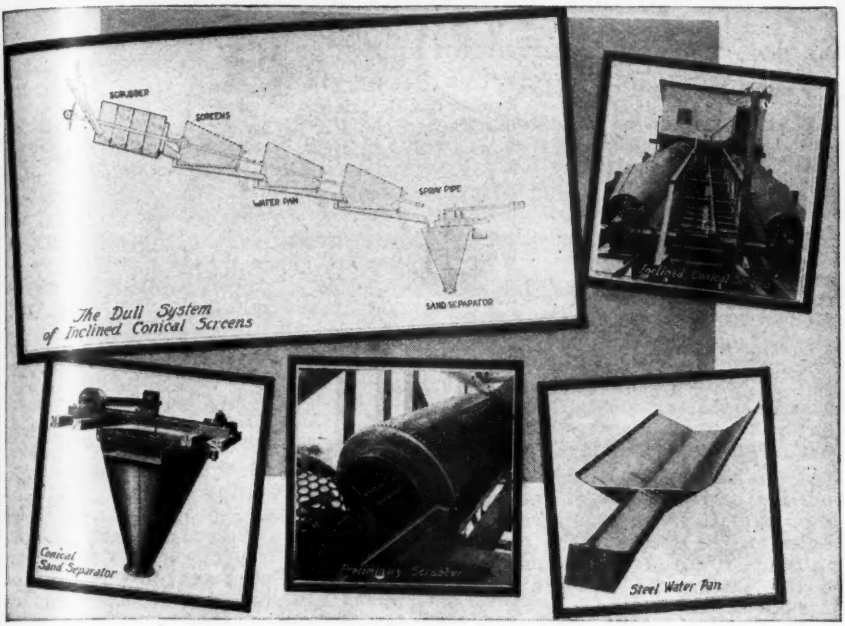
Material running 25 per cent to 50 per cent clay and earthly material can be washed in Dorr classifiers till only one or two per cent of the sands will pass a 100 mesh screen, while the clay will carry a negligible amount of sand to waste. Equally good results are obtained over a wide range of sizes by means of a few simple adjustments.

Operating costs of Dorr classifiers are so low that in most plants they are not carried as a separate account. Operating labor is confined to the time required for lubrication once a day and occasional inspection. The machine is entirely automatic and continuous in operation and so flexible that a good separation is made without adjustments even under widely varying feed conditions. Power requirements vary from 1 to 2½ H. P. for line shaft work or from 3 to 5 H. P. for individual motors, depending on the size and capacity of the machines, which are built to handle up to 75 tons per hour. In most washing plants this power is available from existing sources so that new motors are unnecessary. Repair costs are very low due to low speed of moving parts and the removal of all wearing surfaces from gritty material.

Dorr classifiers make a very special appeal to producers of glass sand, polishing sand, and similar materials which have to be carefully graded and free from impurities. Deposits hitherto considered too low in grade for these purposes can be readily brought up to specifications by the high washing efficiency of these machines. The Little Buffalo Creek Sand Company, of Cabot, Pensylvania, is operating two Dorr Bowl Classifiers taking the discharge from ball mills and washing out minus 150 mesh clay and mica from a silica sand for glass polishing. The Whitehaven Sand & Stone Company of White Haven, Pennsylvania, making locomotive sand is using a standard classifier to eliminate all minus 60 mesh material. In both cases costs have been reduced and the grade of product has been improved. Such products might easily command a higher price in a wider market.

The Dorr classifier consists of a shallow inclined trough closed at the lower end and fitted with reciprocating rakes. Its construction will be readily seen from the accompanying cut of a duplex machine. The feed consisting of the undersize from the final screening operation enters near the lower end. The sands settle to the bottom, where the rakes stir them to wash out the slime, drag them up the incline and discharge them clean and drained at the upper end, while the fines are floated over the lower end. By simple adjustments of speed of rakes, slope of machine, and quantity of wash water added, the sizing can be controlled very closely. The machine is simple and sturdy, requires a minimum of water to do its work, and takes very little headroom.

The Wood County Stone Crushing Co., of Richfield, Wis., is opening a new stone crushing plant March 1st. Oscar E. Lippert will have the management of the plant.



ONE of the reasons for the success of Link-Belt Plants lies in the patented Dull system of inclined conical screens, illustrated.

The gravel, sand and water are fed into the first screen together, and pass directly through the large holes into a water-pan underneath, with the exception of the largest sizes of stones, which are screened out and discharged through the small end of the cone into the first bin. The water-pan delivers into the next screen where the process is repeated for the next operation, and so on through the desired number of separations. The material is fed into the large end of the screen which has the most wearing surface. This method provides the largest screening area where most of the material is screened and heaviest plates where the coarsest material is handled.

Send for Book No. 440

LINK-BELT COMPANY

Chicago—300 W. Pershing Road Philadelphia—Hunting Park Ave. & P. & R. Rwy.

LINK-BELT

Explosives Investigations of the Bureau of Mines

An investigation is being conducted by the United States Bureau of Mines at its explosives chemical laboratory in Pittsburgh, Pa., with the purpose of definitely determining the solubility of organic materials, used in explosives, in solvents that might be used in analyses and purification. Thus far the solubility curve of trinitrotoluene has been determined in benzine, acetone, toluene, ether, carbon bisulphide, carbon tetrachloride, and water. After the study of T. N. T. is completed the solubility of picric acid, tetryl, T. N. A., and similar compounds will be determined.

At the laboratory co-operative work is being carried on with one of the large explosives manufacturing companies on the effects of the crystalizing temperature of ammonium nitrate on the safety and strength of permissible explosives.

An investigation of the products of combustion of T. N. T. (grade 1) under different conditions of loading and pressure is under way. The testing of unconfined loads at low density of loading has been completed, and the testing of confined loads at low density of loading is being continued.

Experiments have been started with the object of establishing a laboratory test that will simulate actual conditions of use and classify explosives with regard to their ability to resist water.

As the testing of sensitiveness of explosives to frictional impact, as carried on at the present time, does not establish the degree of sensitiveness, an investigation is being made by the bureau to devise a method of carrying out the test that will show this property.

Under a co-operative agreement between the Bureau of Mines and the Department of Agriculture, an investigation has been made of the use of cellulose from corncobs in the manufacture of dynamite and nitrocellulose. It was found that the material could be used in dynamite but it is unsatisfactory as a substitute for cotton cellulose in making nitrocellulose.

In the fiscal year recently ended 32 explosives were added to the active permissible list and 55 were transferred to the inactive list. The active list of permissibles contained the names of 156 explosives as compared with 179 explosives at the beginning of the fiscal year.

Beckwith Air Compressor

The Beckwith Air Compressor, a piece of equipment that furnishes 80 cubic feet of free air per minute at 100 lbs. gauge pressure, is built with the idea of doing away with excess weight and making for greater portability.

Power is generated by a Le Roi four cylinder heavy duty truck motor, cast en bloc and having three point suspension. Since 1914, over 40,000 of these engines have been built and sold.

The compressor is the standard duplex type Gardner-Rix, as manufactured by the Gardner-Governor Company. It is a strong, rugged device, built for continuous operation. It is entirely enclosed and dust proof—two removable cover plates are supplied for internal inspection. Compressor is built with opposed cranks, running with very little vibration.

The two units are assembled on a rugged structural steel hot riveted underframe, body bound bolts being used for attaching.

The outfit has sufficient power to operate one Ingersoll Jackhammer or three ordinary riveting hammers or any other number of pneumatic tools having an aggregate air requirement not in excess of 80 cubic feet per minute at 100 lbs. pressure.

Carroll Chain Company

The Carroll Chain Company of Columbus, Ohio, was incorporated on November 1st, for the purpose of engaging in the manufacture of a complete line of welded chain. Capital stock to the extent of $100,000 was promptly subscribed and ground broken for the erection of a high class modern plant. Entirely new equipment of late design will be installed as rapid as the building progress permits.

The company contemplates the production of both fireweld and electric weld chain, but will begin operations by confining the manufacture to fireweld varieties, giving special attention to steam shovel and dredge chains.